

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号
特開2003-71650
(P2003-71650A)

(43) 公開日 平成15年3月12日 (2003.3.12)

(51) Int. Cl. ⁷	識別記号	F I	7-73-10* (参考)
B 2 3 P 19/00	3 0 2	B 2 3 P 19/00	3 0 2 H
21/00	3 0 4	21/00	3 0 4 Z

審査請求 未請求 請求項の数 9 O L (全 11 頁)

(21) 出願番号 特願2002-13480 (P2002-13480)
(22) 出願日 平成14年1月22日 (2002.1.22)
(31) 優先権主張番号 特願2001-183862 (P2001-183862)
(32) 優先日 平成13年6月18日 (2001.6.18)
(33) 優先権主張国 日本 (J P)

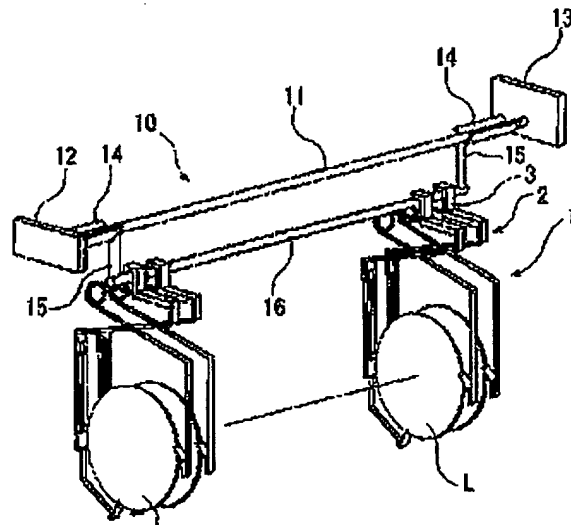
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(54) 【発明の名称】 レンズ保持治具及び搬送治具並びにレンズの処理方法

(57) 【要約】

【課題】 多品種、小ロットのレンズのハードコート処理に対応できるレンズ保持治具、搬送治具、レンズの処理方法を提供する。

【解決手段】 搬送治具10に掛けて吊り下げる掛着部3と、掛着部3に結合されている第1～第3アーム21、22、23のそれぞれに設けられている保持部41、42、43で一枚のレンズLの側面を支えて保持するレンズ保持部2とを有し、一枚のレンズを保持するレンズ保持治具1を用い、搬送治具10と組み合わせる。



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【特許請求の範囲】

【請求項1】 搬送治具に掛けて吊り下げられる掛着部と、前記掛着部に結合されている複数のアームにそれぞれ設けられている保持部で一枚のレンズの側面を支えて保持するレンズ保持部とを有し、一枚の前記レンズを保持することを特徴とするレンズ保持治具。

【請求項2】 請求項1記載のレンズ保持治具において、

前記レンズ保持部が、付勢手段を介して前記レンズの側面に当接するように付勢される前記アームを有すること 10 を特徴とするレンズ保持治具。

【請求項3】 請求項1記載のレンズ保持治具において、

前記レンズ保持部が、コイルバネを介して鋭角的に折曲され、先端側に前記コイルバネにより前記レンズの側面に当接するように付勢される第1保持部を備えている第1アームと、前記第1保持部が当接するレンズの側面と対向する側の側面に当接する第3保持部を備える第3アームと、前記第1保持部が当接する前記レンズの側面と前記第3保持部が当接する前記レンズの側面との間の前記 20 レンズの下方側面に当接する第2保持部を備える第2アームとを有することを特徴とするレンズ保持治具。

【請求項4】 請求項1～3いずれかに記載のレンズ保持治具において、

複数の前記保持部がそれぞれレンズの側面に当接し、前記レンズを保持して前記掛着部で搬送治具に吊されたときに、前記保持部が前記レンズと当接するそれぞれの箇所が、前記レンズの中心を通る鉛直線上にないことを特徴とするレンズ保持治具。

【請求項5】 請求項1～4いずれかに記載のレンズ保持治具において、 30

前記保持部の少なくとも一つが、ワイヤを折曲して形成されていることを特徴とするレンズ保持治具。

【請求項6】 請求項1～5いずれかに記載のレンズ保持治具において、

複数の前記アームのうちの少なくとも一つのアームが、少なくとも処理液中に浸漬される部分において断面がほぼ円形の針金で構成されていることを特徴とするレンズ保持治具。

【請求項7】 請求項1～6いずれかに記載のレンズ保持治具において、 40

前記保持部の少なくとも一つが、レンズの側面の両端縁と当接する凹みを備え、この凹みのレンズと当接する部分が刃状に形成されていることを特徴とするレンズ保持

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けられている第1ピッチと、前記第1ピッチと別の間隔毎に前記鉤部用凹部が設けられている第2ピッチとを有することを特徴とする搬送治具。

【請求項9】 請求項1～7いずれかに記載の複数のレンズ保持治具にそれぞれレンズを保持させ、それぞれのレンズ保持治具の前記掛着部を搬送治具に掛けて吊り下げ、前記レンズを処理液中に浸漬することを特徴とするレンズの処理方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、レンズをハードコート液等の処理液中に浸漬処理等するために用いられるレンズ保持治具及び搬送治具、並びにこのようなレンズの処理方法に関する。

【0002】

【従来の技術】プラスチック眼鏡レンズは、傷が付きやすいため、耐擦傷性を付与するハードコート膜を形成することが行われている。レンズにハードコート膜を形成する方法としては、両面が所定のレンズ面形状に加工された円形レンズの表面にハードコート液を塗布し、その後乾燥、硬化させる方法が一般的である。

【0003】レンズにハードコート液を塗布する方法としては、スピンコート法とディッピング法とがあり、生産性からディッピング法が主流である。

【0004】従来のディッピング法は、まとめて30枚程度のレンズを装着できるレンズ保持治具にレンズを装着し、ハードコート液中にレンズ保持治具ごとレンズを浸漬し、所定時間経過後引き上げ、レンズ保持治具にレンズを装着したまま乾燥を行う方法が採用されている。

【0005】ディッピング法に用いられている従来のレンズ保持治具の一例を図8に示す。図8(a)は、レンズ保持治具の正面図、図8(b)は側面図である。

【0006】このレンズ保持治具600は、レンズLを装着する15道線のレンズ受け610が2列配置され、合計30枚のレンズLをまとめて装着できるようになっている。レンズ受け610は、レンズLの側面を3点の保持部630で保持し、そのうち1点は板バネ状になっている。レンズ受け610は、レンズLの厚みに応じた等間隔ごとのピッチで配置されている。レンズ保持治具600には、レンズ保持治具600を搬送するための搬送治具620が一体に設けられている。

【0007】

【発明が解決しようとする課題】しかしながら、従来のレンズ保持治具600には次のような問題点があった。

本発明は、従来のレンズ保持治具600の問題点を解決する。

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保持する先端がM字状の保持部630を有するレンズ保持治具600を示しているが、レンズLの側面が厚いときには針状に尖った保持部630を有するレンズ保持治具600を用いる必要がある。このため、非常に多種類のレンズ保持治具を用意しなければならず、そのための設備費が大きく、管理が煩雑になるといった問題点がある。

【0008】また、レンズの径やレンズの厚みに応じてレンズ保持治具を選択する必要があるため、レンズの細かい分別作業が必要であり、そのために煩雑な手順を要するという問題点がある。一人のための左右の眼の特注レンズ（ペア品という）では、左右のレンズでレンズ径や極端に度数が異なる場合、一つのレンズ保持治具にペア品を装着することができないため、別のレンズ保持治具にペア品をそれぞれ装着することになり、そのため後にペア品を製造工程中で合流させるペアリングの手間が必要であるという問題点がある。

【0009】また、従来のレンズ保持治具600は、レンズ受け610以外のレンズ受け610を支える骨組みが多く、ハードコート液に浸漬されるときに、これらの骨組みにもハードコート液が付着するため、ハードコート液が無駄になり、ハードコート液の利用効率が低いという問題点がある。

【0010】更に、レンズ受けが15重装で密に配置されているため、レンズを装着する際に、レンズに傷を付けやすいという作業性や歩留まりの問題点がある。

【0011】特に、近年、レンズの特注品が多くなり、多品種、小ロットになって、レンズ保持治具に装着されるレンズの充填率が低くなっており、これらの問題点が顕著になってきている。

【0012】本発明は、上記事情に鑑みてなされたもので、従来のレンズ保持治具の問題点を解消し、多品種、小ロットに対応できるレンズ保持治具を提供することを目的とする。

【0013】また、本発明は、かかる多品種、小ロットに対応できるレンズ保持治具を搬送できる搬送治具を提供することを目的とする。

【0014】更に、本発明は、多品種、小ロットのレンズを浸漬処理等するレンズの処理方法を提供することを目的とする。

【0015】

【課題を解決するための手段】上記目的を達成するため、請求項1記載の発明は、搬送治具に掛けて吊り下げられる掛着部と、前記掛着部に結合されている複数のア

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式のレンズ保持部とし、搬送治具も別体とした構造に相当する。一枚のレンズを一つのレンズ保持治具で保持する毎葉式であるため、レンズの種類に応じたレンズ保持治具を用意すれば、多種類のレンズをそれぞれレンズ保持治具で保持し、一つの搬送治具に吊してハードコート液等に浸漬することができる。そのため、多品種、小ロットに対応することができる。また、吊り下げ式であるため、レンズ以外にハードコート液が付着する量は少なく、ハードコート液の利用効率が低い。また、レンズ一枚を一つのレンズ保持治具に装着し、広い空間を利用して作業することができるため、レンズに傷を付けるミスも減少する。更に、レンズ保持部をレンズの径の違いに対応できるようにすれば、レンズ径によらず、多種類のレンズを一種類のレンズ保持治具で保持することが可能であるため、レンズの分別作業も簡単になる。

【0017】請求項2記載の発明は、請求項1記載のレンズ保持治具において、前記レンズ保持部が、付勢手段を介して前記レンズの側面に当接するように付勢される前記アームを有することを特徴とするレンズ保持治具を提供する。

【0018】このようなレンズ保持治具は、保持部が付勢手段を介してレンズ側面に付勢されているアームを有するため、保持部の可動範囲が広く、幅広い径のレンズに対応してこれを保持できる。

【0019】請求項3記載の発明は、請求項1記載のレンズ保持治具において、前記レンズ保持部が、コイルバネを介して鋭角的に折曲され、先端側に前記コイルバネにより前記レンズの側面に当接するように付勢される第1保持部を備えている第1アームと、前記第1保持部が当接するレンズの側面と対向する側の側面に当接する第3保持部を備える第3アームと、前記第1保持部が当接する前記レンズの側面と前記第3保持部が当接する前記レンズの側面との間の前記レンズの下方側面に当接する第2保持部を備える第2アームとを有することを特徴とするレンズ保持治具を提供する。

【0020】第1アームの第1保持部がレンズ側面を、第3アームの第3保持部が他方側のレンズ側面を、第2アームの第2保持部が下側のレンズ側面を保持して3点支持で安定に保持できると共に、第1保持部の可動範囲が広く、幅広い径のレンズに対応してこれを保持できる。

【0021】請求項4記載の発明は、請求項1～3いずれかに記載のレンズ保持治具において、複数の前記保持部がそれぞれレンズの側面に当接し、レンズを保持して

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上げたときに、レンズから垂れ落ちるハードコート液が保持部を通り、保持部にレンズ表面の液膜が引き寄せられてレンズ表面に均一なハードコート膜が形成されないおそれがある。

【0023】請求項5記載の発明は、請求項1～4いずれかに記載のレンズ保持治具において、前記保持部の少なくとも一つが、ワイヤーを折曲して形成されていることを特徴とするレンズ保持治具を提供する。

【0024】ワイヤーを折曲して形成された保持部は、レンズ側面との接触面積が小さく、しかも表面積が小さく処理液の付着が少ないため、レンズ表面に付着した処理液に対して影響を及ぼすおそれが少なく、レンズ表面の液膜が保持部に引き寄せられ、均一な塗膜の形成を妨げることを可及的に抑制することができる。

【0025】請求項6記載の発明は、請求項1～5いずれかに記載のレンズ保持治具において、複数の前記アームのうちの少なくとも一つのアームが、少なくとも処理液中に浸漬される部分が断面がほぼ円形の針金で構成されていることを特徴とするレンズ保持治具を提供する。

【0026】断面がほぼ円形の針金で構成されているアームは、処理液の付着量が少なく、しかも、洗浄が容易である。

【0027】請求項7記載の発明は、請求項1～6いずれかに記載のレンズ保持治具において、前記保持部が、レンズの側面の両端縁と当接する凹みを備え、この凹みのレンズと当接する部分が刃状に形成されていることを特徴とするレンズ保持治具を提供する。

【0028】保持部のレンズの側面を挟むように当接する凹みの先端を刃状にして接触面積を最小限とすることによって、レンズ表面の液膜が保持部に引き寄せられ、均一な塗膜の形成を妨げることを可及的に抑制することができる。

【0029】請求項8記載の発明は、請求項1～7いずれかに記載のレンズ保持治具の鉤状の掛着部が掛けられる構造を備える搬送治具であって、前記構棒の上面に前記鉤状の掛着部を嵌める複数の鉤部用凹部が設けられ、所定の間隔毎に前記鉤部用凹部が設けられている第1ピッチと、前記第1ピッチと別の間隔毎に前記鉤部用凹部が設けられている第2ピッチとを有することを特徴とする搬送治具を提供する。

【0030】ピッチが異なる第1ピッチと第2ピッチにレンズの厚みに応じて適当なピッチの鉤部用凹部を選択してレンズ保持部の鉤状の掛着部を掛けることによって、レンズの厚みに応じた鉤部用凹部を選択して容易に

【0032】このレンズの処理方法によれば、レンズの径やレンズの厚みに対応したレンズ保持治具を準備することによって、一つの搬送治具に多種類のレンズを混載可能にでき、多品種、小ロット生産に適したレンズの処理方法とすることができる。

【0033】

【発明の実施の形態】以下、本発明のレンズ保持治具、搬送治具、レンズの処理方法の実施の形態について説明するが、本発明は以下の実施の形態に限定されるものではない。

【0034】図1は、本発明のレンズ保持治具の第1実施形態の複数個を搬送治具の一実施形態に掛けて吊り下げた状態を示す斜視図である。図2は、第1実施形態のレンズ保持治具単体の一部断面を含む正面図である。図3は第1実施形態のレンズ保持治具単体の第2アームと第3アームを手前に配置した斜視図である。

【0035】図1に示すように、本発明のレンズ保持治具1と搬送治具10は、従来のレンズ保持治具のレンズ受けを一つ一つ分離してレンズを保持する単体のレンズ保持部2とし、搬送治具10も別体とし、搬送治具10に掛けて吊り下げる掛着部3をレンズ保持部2上部に設けたような構造になっている。

【0036】レンズ保持治具1は、ステンレススチールで全体が構成されている。図2に示すように、搬送治具10に掛けて吊り下げられるレンズ保持治具1全体を支える掛着部3としての鉤状の鉤部30を備える。鉤部30は、搬送治具10に掛けたときに揺れないようにやや肉厚で幅広になっており、搬送治具10の構棒16の図1に示していない断面略矩形状の鉤部用凹部の上面と左右側面に嵌まって安定するように内面が形成されている。

【0037】鉤部30の下端に図2左側の第1アーム21と図2右側の第2アーム22に水平方向に分歧して結合している。一方の第1アーム21は針金状で、ほぼ水平方向に延びている第1水平部211から付勢手段としてのコイルバネ212を介して水平方向から下方へ鋭角に折り返されている。折り返されて図2右側斜め下方へ傾斜している第1傾斜部213は、レンズLの図2右側上方位置で鉛直方向よりやや内側に折曲され、鉛直方向よりやや左側へ傾斜して延びる第1鉛直部214となり、その先端はレンズLの中央側面近傍に位置している。第1鉛直部214の先端部の内面側にレンズLの右側面と当接する第1保持部41が一体に取り付けられている。

【0038】他の第2アーム22は、図2右側の第2傾斜部221と、その先端部が第1傾斜部213の先端部とほぼ

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図2左側斜め下方へ傾斜する第2傾斜部223が形成されている。これらの第1アーム21と第2アーム22とは、ほぼ同一平面上で折曲されている。第2傾斜部223は、第1アーム21の第1傾斜部213とはほぼ同一平面上で交差してレンズLの図2左側上方位で鉛直方向よりやや内側へ折曲され、鉛直方向よりやや右側へ傾斜して延びる第2鉛直部224となっている。図2、図3に示すように、第2鉛直部224の上部で帯状板222が幅方向のほぼ中心で鉛直方向に2分割され、第3アーム23として分岐している。第2アーム22の第2鉛直部224は、レンズLの図2左側斜め下でレンズL側に向かって折曲されて第3傾斜部225となり、第3傾斜部225の先端の内面にレンズL側面と当接する第2保持部42が一体に取り付けられている。第2保持部42先端はレンズの中心を通る鉛直線Vから偏心してやや左側のレンズLの下方側面に当接するようになっている。

【0039】第2アーム22の第2鉛直部224上部で第2アーム22と分岐した第3アーム23は、第2アーム22の第2鉛直部224とはほぼ平行して延び、レンズLの中央左側側面近傍に達する位置に先端が配置されている。第3アーム23の先端の内面には第3保持部43が一体に設けられ、第3保持部43の先端がレンズL左側の側面に当接する。

【0040】図2、図3に示すように、第2アーム22の第1アーム21と交差する帯状板222の第2傾斜部223には、幅方向中心に沿って第1アーム21が通る細長い案内孔226が穿設され、案内孔226に第1アーム21の第1傾斜部213が通されている。

【0041】第1アーム21の先端の第1保持部41は、コイルバネ212の付勢力でレンズL中心側に向かって付勢されている。そのため、レンズLは、図2に示すように、下方の側面を第2保持部42で、左側側面を第3保持部43でそれぞれ受けられ、右側のやや上方側面を第1アームの先端の第1保持部41が押圧し、これらの第1保持部41、第2保持部42、第3保持部43の三点支持で保持される。

【0042】図6に保持部の一例を示す。レンズLの側面が厚い場合は、図6(a)に示すように、先端が針状に尖った板状保持部401が用いられ、尖った先端をレンズLの側面に押圧することによってレンズLを三箇所

で保持する。

【0043】図6(b)に示す板状保持部402の凹み402aの先端は、刃状402bに形成され、レンズL側面と接触する面積をできる限り少なくしている。これにより、板状保持部402近傍のレンズL表面に形成されたハードコート液の液膜が板状保持部402に引き寄せられて、板状保持部402が接触したレンズL表面近傍のハードコート膜の膜厚が薄くなることを防止している。

【0044】図2、図3に示したレンズ保持治具1は、第1アーム21がコイルバネ212を介して鋭角に折り返され、コイルバネ212の支点から第1保持部41までのストロークが長くとれ、バネの積み重ねを多くできるため、第1アーム21はレンズLの側面に対して離間接近する可動範囲が広がっている。そのため、広い範囲のレンズの外径に対応できる。例えばレンズの外径は、60～80mmの範囲で2～3mm刻みの9種類がある。従来はこの9種類ごとにレンズ保持治具が必要であったが、本実施形態のレンズ保持治具1では、第1アーム21の可動範囲が広いので、例えば2種類のレンズ保持治具1で60～80mmの範囲をカバーできる。その結果、図6(a)、(b)に示したレンズの厚みに対応した板状保持部401、402の2種類を加えて4種類のレンズ保持治具1で現在のレンズ全てをほぼカバーできる。

【0045】これによって、多種類のレンズ保持治具1を準備しなくても良く、設備費が低減され、管理も簡易になる。しかも、レンズの径毎に分別する作業が簡易になり、生産性が向上する。ヘア品も一つの搬送治具と一緒に処理できる可能性が高いため、ヘアリングの煩雑さも少なくなる。

【0046】また、第1アーム21の第1傾斜部213は、第2アーム22の案内孔226を通して第2アーム22の第2傾斜部223と交差している。これにより、第1アーム21のレンズL側面に対して離間接近する動きが第2アーム22の案内孔226で制限され、第1アーム21の平面上的動きが、第2アーム22の折曲して形成されている仮想平面とほぼ同一になることが確保され、相互に干渉が生じないようにしている。このため、第1保持部41と第2保持部42でレンズLの側面を確実に挟持することができる。

【0047】また、レンズLの下方を支える第2保持部42は、図2に示すように、レンズの側面と当接している箇所が、レンズ保持治具1を搬送治具10に釣鉤30

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が引き寄せられ、ツリー状のスジが発生することが経験的に認められる。

【0049】本実施形態のレンズ保持治具1では、レンズ中心を通る鉛直線V上から第2保持部42の当接位置が偏心しているため、このようなツリー状のスジの発生を抑制することができる。

【0050】また、本実施形態のレンズ保持治具1では、図3に示したように、第3アーム23が鉛直方向の第2アーム22を縦に分割して枝分かれして設けられ、第2アーム22と第3アーム23とはレンズLの厚さ方向に並列している。その結果、第2保持部42以外に第2アーム22とレンズL側面との間に橋渡しをするものがない構造となっている。第1アーム21と第3アーム23についても同様に、それぞれ第1保持部41と第3保持部43以外にレンズL側面と接するものがない構造となっている。そのため、ハードコート液にレンズを浸漬し、引き上げる際にレンズL側面とこれらの第1アーム21、第2アーム22、第3アーム23との間にハードコート液の膜が形成されないようになっている。ハードコート液の膜が形成されると、膜がはじける際にはじけた液滴がレンズに付着し、不良の発生原因となるが、本実施形態のレンズ保持治具1ではこのような不良が生じ難い構造となっている。

【0051】レンズLをレンズ保持治具1に保持させる作業は、例えば、第1アーム21の第2アーム22と交差後の斜めになっている第1傾斜部213を第2アーム22の矩形板221側に指で引き寄せて第1アーム21を大きく開き、レンズLの側面を第2保持部42と第3保持部43に当接させた後、コイルバネ212の付勢力に従って第1アーム21の先端の第1保持部41をレンズL側面に当接させるようにすればよい。

【0052】このような作業でレンズLをレンズ保持治具1に保持させることができるため、従来のレンズ保持治具600のレンズ受け610の狭い隙間にレンズLを装着する作業と異なり、レンズLに傷を付けるおそれは小さく、歩留まりを向上させることができる。

【0053】また、レンズ保持治具1が破損したときに、レンズ1枚分のレンズ保持治具1の破損であるため、従来のレンズ30枚を装着するレンズ保持治具500と異なり、損失が少なく済む利点がある。

【0054】次に、図4～図6を参照しながら本発明のレンズ保持治具の第2実施形態について説明する。図4は、レンズ保持治具の正面側から見た斜視図、図5は、前方斜め上から見た斜視図である。

【0055】第2実施形態のレンズ保持治具1は、図4

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16に掛けて吊すことによりレンズ保持治具1b全体を支える掛着部3bとしての鉤部30bと、この鉤部30bに結合されているレンズ保持部2bとを有する。鉤部30bは、やや厚手の矩形板を折曲して形成され、搬送治具10の溝部16の図1に示していない断面略矩形状の鉤部用凹部の上面と左右側面に嵌まって安定するように形成された凹凸型の形状を有する支持部31bとこれと一体に形成されている水平板32bとを有する。

【0057】レンズ保持部2bは、それぞれ基端部が鉤部30bの水平板32bに結合され、先端部が自由端になっている第1アーム21b、第2アーム22b、第3アーム23bを有する。これらの第1アーム21b、第2アーム22b、第3アーム23bは、基本的に断面がほぼ円形の針金で構成されている。

【0058】第1アーム21bの基端部は、鉤部30bの水平板32bの上面にこれと平行に接合されている。基端部から水平方向に延伸する第1水平部211bから、付勢手段としてのコイルバネ212bを介して水平方向から斜め下方へ鋭角に折り返されている。折り返されて図4斜め右側へ傾斜している第1傾斜部213bは、レンズLの右側端よりやや右側で鉛直方向よりやや内側に折曲され、鉛直方向よりやや左側へ傾斜して延伸している第1鉛直部214bとなり、その先端がレンズLの中央右側面近傍に位置するようになっている。第1アーム21bの先端部はプレス等で扁平に形成されて取付部215bが形成され、取付部215bには細いワイヤを折曲して形成された第1保持部41bの基端部が接合されている。第1保持部41bの基端部から立ち上がる部分は、第1アーム21bの先端縁にほぼ位置している。

【0059】第2アーム22bと第3アーム23bとは、それぞれ鉤部30bの水平板32b下面に断面がω型に形成された案内板24を介して基端部が接合され、基端部から第1アーム21bとは逆の図面右水平方向に延伸している第1水平部221b、231bを有する。これらの第1水平部221b、231bから左側斜め下方に向かって鋭角的に折曲され、この斜め左下方へ延伸している第2傾斜部222bと232bが、第1アーム21bの第1傾斜部213bを両側から挟むように第1アーム21bと交差している。第2傾斜部222b、232bからレンズLの左端よりやや左側で鉛直方向よりやや右方向に折曲され、鉛直方向よりやや右側に向かって傾斜している第2鉛直部223b、233bになっている。第2アーム22bは更にレンズL斜め左下側で右側で折曲され、折曲された第2傾斜部224bが、第1傾斜部213bの右側を挟むように折曲されている。

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る。第2保持部42bは、図6(b)に示した先端がM型状の板状保持部402である。第3アーム23bの第2鉛直部232bの先端は、レンズL中央左側面近傍に位置するように延伸されている。第3アーム23bの第2鉛直部233bの先端部は、プレス等で扁平に形成されて取付部235bが形成され、取付部235bにはワイヤを折曲して形成された第3保持部43bの基端部が接合されている。第3保持部43bの基端部から立ち上がる部分は、第3アーム23bの先端縁にほぼ位置している。第2アーム22bと第3アーム23bのそれぞれ15の第2鉛直部223b、233bの上部は、連結板25によって、第2アーム22bと第3アーム23bのそれぞれの第2鉛直部223b、233bがレンズLの側面とほぼ平行になるように相互に固定されている。図5に示すように、第1アーム21b、第2アーム22b及び第3アーム23bは、レンズLの側面とほぼ平行になるように折曲されている。

【0060】第2実施形態のレンズ保持治具1bに取り付けられている第1保持部41bと第3保持部43bは、図6(d)に示すように、細いワイヤを折曲して形成されたワイヤ状保持部404になっている。ワイヤ状保持部404は、側面が薄いレンズLの左右の両側面のそれぞれの両端縁に当接するように略く字状にワイヤが折曲されたく字状部404aを有する。このく字状部404aを第1アーム21bと第3アーム23bのそれぞれの取付部215b、235bに接合されている基端部に接続する接続部404bは、それぞれの取付部215b、235bの先端縁から立ち上がり、レンズLの側面と外れた方向に延伸している。図4、図5に示したレンズ保持治具1bでは、第1保持部41bと第3保持部43bがこの図6(d)に示すワイヤ状保持部404であり、第2保持部42bは、図6(b)に示した板状保持部402であったが、第2保持部42bもワイヤ状保持部404としてもよい。側面が厚いレンズの場合は、図6(c)に示すように、第1保持部41b、第2保持部42b、第3保持部43bは、それぞれ針金の先端が尖った針状の針金状保持部403を用いる。

【0061】第2実施形態のレンズ保持治具1bは、レンズLの左右両側面を第1保持部41bと第3保持部43bで、レンズLの下方の側面を第2保持部42bで保持する。第2実施形態のレンズ保持治具1bは、基本的な構成は第1実施形態のレンズ保持治具1とはほぼ同じであるため、第1実施形態のレンズ保持治具1と同様の効果を有する。

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面と当接している箇所が、レンズ保持治具1bを搬送治具10に吊したときに、レンズLの中心を通る鉛直線V_L上から偏心した位置にあるため、第2保持部42bに処理液が引き寄せられてレンズL表面の処理液の液膜の厚さに不均一を生じさせるおそれはない。

【0063】また、第1アーム21bの第1傾斜部213bは、第2アーム22bの第2傾斜部222bと第3アーム23bの第2傾斜部232bと挟まれて交差している。これにより、第1アーム21bのレンズL側面に対して離間接近する動きを、第2アーム22bの第2傾斜部222bと第3アーム23bの第2傾斜部232bがいわば案内として規制し、第1アーム21bの平面上の動きが、レンズLの側面とほぼ平行になることが確保されている。

【0064】第2実施形態のレンズ保持治具1bでは、これらの効果に加えて、第1アーム21b、第2アーム22b、第3アーム23bが断面円形の針金で構成され、表面積が最小になるようになっている。そのため、ハードコート液の付着量が少なく、しかも洗浄により付着物が簡単に剥離するため、容易に洗浄できるという効果が加わる。また、第1保持部41bと第3保持部43bとが、細いワイヤを折り曲げて形成されているワイヤ状保持部404であるため、図6(b)に示した板状保持部402よりも処理液の付着量が少なく、そのために第1保持部41b、第3保持部43bにハードコート液が引き寄せられてレンズL表面の処理液の液膜の厚さに不均一を生じさせるおそれが少なくなり、ハードコート処理での歩留まりが顕著に向上することが認められる。

また、図6(a)に示した板状保持部401を図6(c)に示した針金状保持部403に変更したことにより、ハードコート液の付着量が少なくなる。

【0065】更に、第2実施形態のレンズ保持治具1bは、第1実施形態のレンズ保持治具1よりも、更にハードコート液の膜ができにくい構造となっている。即ち、第1実施形態のレンズ保持治具1の第1保持部41と第3保持部43がそれぞれ第1アーム21と第3アーム23の先端縁からやや距離をおいた位置から斜め上に立ち上がっており、折曲されている金属板で構成されている板状保持部402とこれと対向しているレンズLの側面との間にハードコート液の膜が生じることがあった。これに対し、第2実施形態のレンズ保持治具1bでは、第1保持部41bが第1アーム21bのほぼ先端縁から、第3保持部43bが第3アーム23bのほぼ先端縁から立ち上がる構造となっていることと、ワイヤ状保持部404のく字状部404aがレンズLの側面と外れた方向に延伸していることと、

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及び第2実施形態のレンズ保持治具1bは、第1アーム21、21bがコイルバネ212、212bの付勢力でそれぞれ先端の第1保持部41、41bをレンズL側に付勢するようになっている。そのため、例えばコイルバネ212、212bを構成する第1アーム21、21bの線径を太くしたり細くすることによって、コイルバネ212、212bのバネ圧を変化させることが可能である。例えば、第1アーム21、21bの線径を細くすることによって、バネ圧を減少させ、外周縁が薄くなった非円形レンズも変形させることなく保持することが可能となる。即ち、この非円形レンズは、レンズの厚み（中心厚）を薄くしたい顧客の希望がある場合に、全体の厚みを均等に削った薄型レンズである。特に凸レンズ（+範囲のレンズ）では、外周部が薄くなり、外周部が削られて楕円形や非円形になる場合がある。外周部が削られた非円形レンズの外周縁は薄く刃先のように尖っており、強い力で両側から挟んだ状態で熱を加えると変形を生じてしまうおそれがある。本発明のレンズ保持治具1、1bでは、コイルバネ212、212bのバネ圧を変更することによってこのような非円形レンズも保持可能である。

【0067】次に、本発明のレンズ保持治具1、1bを搬送する本発明の搬送治具10について説明する。搬送治具10は、図1に示したように、主軸棒11の両端縁に矩形状板の位置合わせ板12、13が軸方向と直交する方向でかつ水平方向に一体に設けられ、主軸棒11の位置合わせ板12、13より両側の内側に断面V字状の受け渡し板14が主軸棒11を下から挟むように一体に設けられている。更に、主軸棒11の受け渡し板14の両側の内方下面には、鉛直方向の釣り棒15が一体に設けられ、この釣り棒15と一体に構棒16が主軸棒11とはほぼ平行に設けられている。この構棒16にレンズ保持治具1、1bの鉤部30、30bを掛けて吊すことにより、複数のレンズ保持治具1、1bをまとめて搬送することができる。

【0068】搬送治具10の一実施形態の側面図を図7に示す。図7は構棒16に設けられている鉤部用凹部17の配列を示すものである。この鉤部用凹部17は、レンズ保持部1の鉤部30、30bの内面が嵌め込まれて固定されるもので、図7の一番左の第1鉤部用凹部17-1から一番右の第20鉤部用凹部17-20までこの搬送治具10では20個の鉤部用凹部17が設けられている。第1鉤部用凹部17-1と次の第2鉤部用凹部17-2の間にはやや幅広の凸部が設けられている。第2

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ている。第6鉤部用凹部17-6から第8鉤部用凹部17-8までは第2鉤部用凹部17-2から第4鉤部用凹部17-4と同様に3連装となっている。第5鉤部用凹部17-5から以降は、第1鉤部用凹部17-1から第4鉤部用凹部17-4部と同じ配列が繰り返されている。

【0069】3連装の第2鉤部用凹部17-2～第4鉤部用凹部17-4はそれぞれピッチaの間隔で設けられている。第1鉤部用凹部17-1と第2鉤部用凹部17-2との間のピッチは、ピッチaの2倍のピッチのピッチbになっており、第2鉤部用凹部17-2と第4鉤部用凹部17-4との間、第4鉤部用凹部17-4と第5鉤部用凹部17-5との間もピッチbの間隔である。一方、第1鉤部用凹部17-1と第3鉤部用凹部17-3との間のピッチはピッチb+ピッチaであるからピッチaの3倍のピッチのピッチcとなっており、第3鉤部用凹部17-3と第5鉤部用凹部17-5との間のピッチもピッチcとなっている。例えば、ピッチaは10mm、ピッチbは20mm、ピッチcは30mmである。

【0070】即ち、本実施形態の搬送治具10は、レンズの厚みによってピッチb又はピッチcを選択することができるようになっている。例えば、レンズの厚みの薄いレンズを保持したレンズ保持治具1、1bを搬送治具10に掛けるときは、ピッチbで掛け、レンズの厚みが厚いレンズ保持したレンズ保持治具1、1bを掛けるときは、ピッチcを選択して掛けることによって、レンズ相互を接触させずにレンズの厚みに応じた最大のレンズ枚数を搬送治具10に容易にセットすることができる。また、ピッチbを選択して掛ける途中で、レンズの厚みの厚いレンズをピッチcを選択して掛けることにより、異なるレンズの厚みのレンズを混載して搬送治具10にセットすることも可能である。

【0071】本実施形態の搬送治具10は、鉤部用凹部17を等間隔で並べるのではなく、ピッチの選択が容易に行えるように鉤部用凹部17を不等間隔で配置している。

【0072】次に、レンズ保持治具1、1bと搬送治具10を組み合わせたものの使用方法を説明する。図1に示したように、本発明のレンズ保持治具1、1bにレンズLを保持させ、レンズLを保持したレンズ保持治具1、1bを本発明の搬送治具10の構棒16に掛け、吊したレンズLに種々の処理を施すことができる。

【0073】例えば、ハードコート処理の前に、アルカリ処理、酸処理、純水洗浄槽などの前処理槽に搬送し、レンズLをこれらの前処理槽に順次浸漬し、レンズ面の

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上げ速度で搬送治具を引き上げ、レンズLに付着しているハードコート液を液切れする。その後、搬送治具10を乾燥炉に搬送し、レンズLやレンズ保持治具1、1bに付着しているハードコート液の乾燥を行う。

【0075】次に、例えば乾燥したハードコート膜が付着しているレンズLをレンズ保持治具1、1bから外し、レンズLを焼成炉で焼成し、ハードコート膜を硬化させ、耐擦傷性を付与するハードコート膜をレンズ表面に形成することができる。

【0076】このように、本発明のレンズ保持治具1、1bと搬送治具10を組み合わせることによって、多種類のレンズLを搬送治具10に複数して処理することができるので、多品種、小ロットに対応して効率的にレンズの処理を行うことができる。

【0077】また、本発明のレンズ保持治具1、1bでレンズLを保持させてレンズ保持治具1、1bを搬送治具10に掛け、ハードコート液にレンズLを浸漬する方法では、第1実施形態のレンズ保持治具1では、第2アーム21と第3アーム23の分岐点より下を、第2実施形態のレンズ保持治具1bでは、連結板25より下をハードコート液に浸漬する。レンズL以外にハードコート液が付着するのは、第1～第3アーム21、21b、22、22b、23、23bの先端と第1～第3保持部41、41b、42、42b、43、43bであり、これらのアーム21、21b、22、22b、23、23bを支える骨組みにはハードコート液は付着しないので、レンズ保持治具1、1bにハードコート液が付着する量は、従来のレンズ保持治具600と比較して格段に少なく、その結果、ハードコート液の利用効率が向上すると共に、レンズ保持治具を洗浄する洗剤の使用量も減少し、生産コストを低減することができる。

【0078】上記説明では、掛着部は鉤状の鉤部として説明しているが、例えば突出部に掛けるリング状、あるいは2本以上の横棒に掛けるような丁字状のような形状であっても良い。また、搬送治具もフック状の突出部を設けた構造でも良く、横棒を並列したような構造であっても良い。

【0079】

【発明の効果】本発明のレンズ保持治具は、レンズを一枚毎に保持して個々に搬送治具に吊すようにしているので、多品種、小ロットに対応して効率的に多種類のレンズを一つの搬送治具に複数することが可能となった。

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【0080】本発明の搬送治具は、レンズの厚みに対応して容易にレンズ保持治具をセットすることができる。

【0081】本発明のレンズの処理方法によれば、多種類のレンズをまとめて処理することができるので、多品種、小ロットに対応して効率的にレンズの処理を行うことができる。

【図面の簡単な説明】

【図1】本発明のレンズ保持治具の第1実施形態を搬送治具に掛けて吊した状態を示す斜視図である。

【図2】本発明のレンズ保持治具の第1実施形態を示す一部断面を含む正面図である。

【図3】本発明のレンズ保持治具の第1実施形態を示す斜視図である。

【図4】本発明のレンズ保持治具の第2実施形態を正面側から見た斜視図である。

【図5】本発明のレンズ保持治具の第2実施形態を斜め上方から見た斜視図である。

【図6】レンズ保持治具のレンズを保持する保持部の形状を示すもので、(a)は先端を尖らせた板状保持部、(b)はM型状の板状保持部、(c)は先端が尖った針金状保持部、(d)はワイヤが折曲されたワイヤ状保持部を示す。

【図7】本発明の搬送治具の一実施形態を示す側面図である。

【図8】従来のレンズ保持治具を示すもので、(a)は正面図、(b)は側面図である。

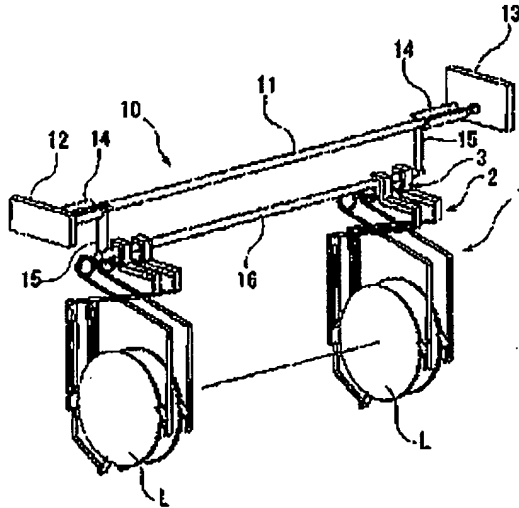
【符号の説明】

1、1b	レンズ保持治具
2、2b	レンズ保持部
21、21b	第1アーム
212、212b	コイルバネ
22、22b	第2アーム
23、23b	第3アーム
3、3b	掛着部
30、30b	鉤部
41、41b	第1保持部
42、42b	第2保持部
43、43b	第3保持部
10	搬送治具
16	横棒
L	レンズ

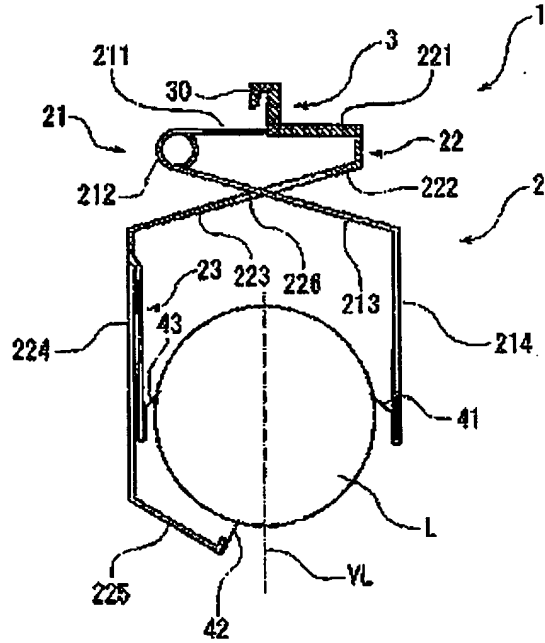
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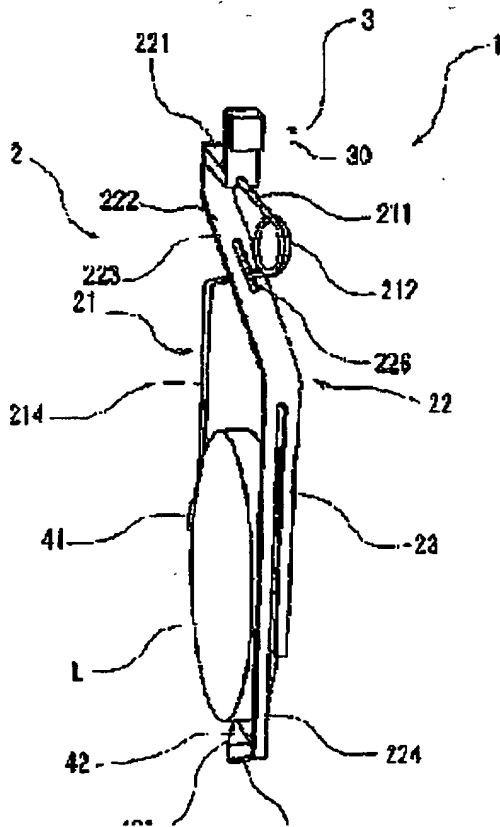
【図1】



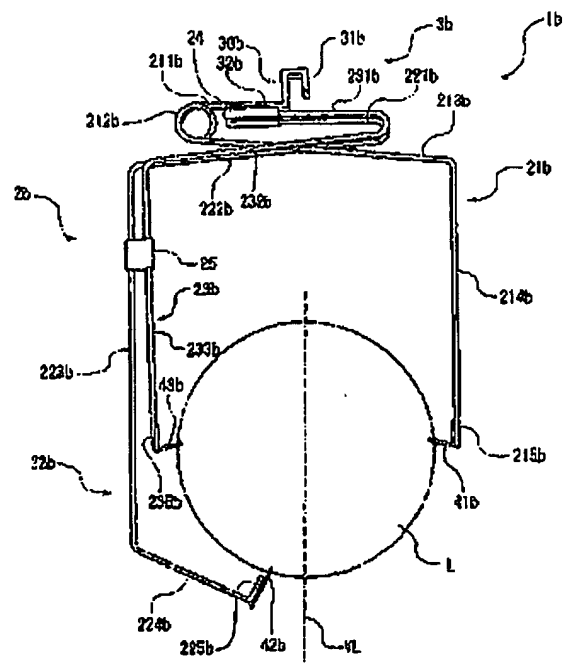
【図2】



【図3】



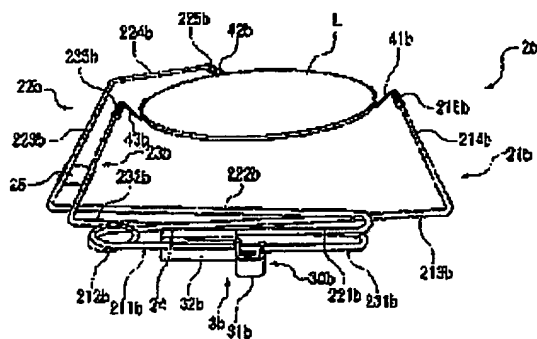
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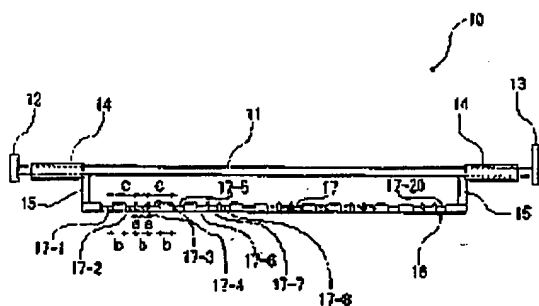
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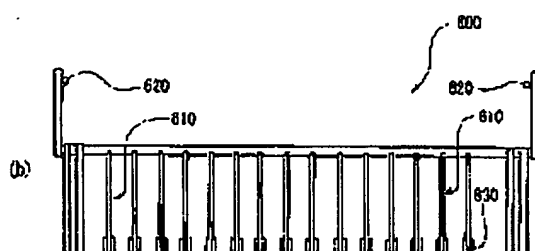
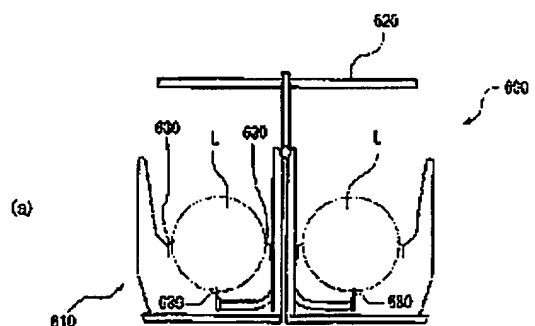
【図5】



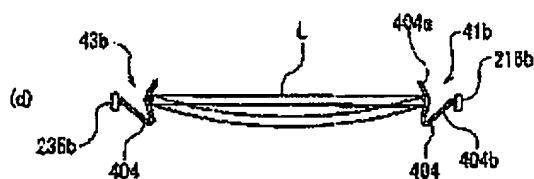
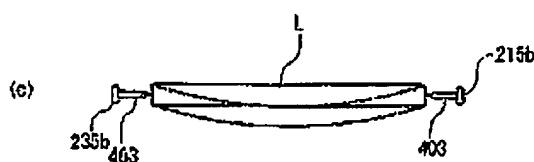
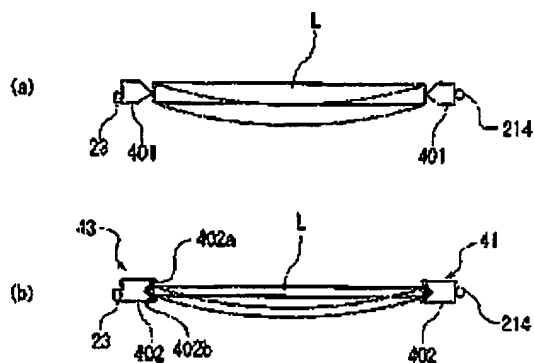
【図7】



【図8】



【図6】



PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2003-071650

(43)Date of publication of application : 12.03.2003

(51)Int.Cl.

B23P 19/00
B23P 21/00

(21)Application number : 2002-013480

(71)Applicant : SEIKO EPSON CORP

(22)Date of filing : 22.01.2002

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(30)Priority

Priority number : 2001183862

Priority date : 18.06.2001

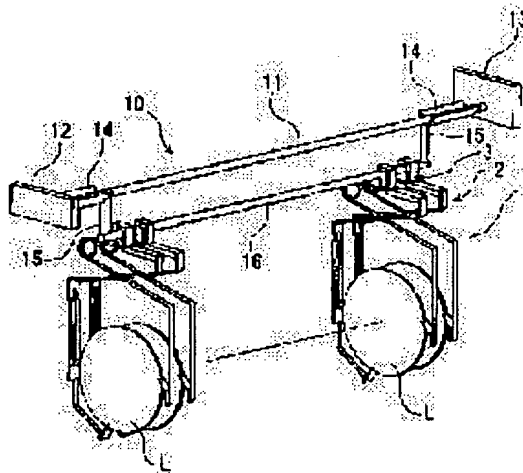
Priority country : JP

(54) LENS HOLDING FIXTURE, CONVEYING FIXTURE, AND TREATING METHOD OF LENS

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a lens holding fixture, a conveying fixture, and a treating method of a lens capable of responding to hard coating treatment of various kinds and a small lot of lenses.

SOLUTION: A hanging part 3 hung and suspended on the conveying fixture 10, and a lens holding part 2 for supporting and holding a side surface of one lens L with respective holding parts 41, 42, and 43 disposed on first and third arms 21, 22, and 23 connected to the hanging part 3 are provided. The lens holding fixture 1 for holding one lens is used and combined with the conveying fixture 10.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

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CLAIMS

[Claim(s)]

[Claim 1] The lens maintenance fixture characterized by having the suspension section which hangs on a conveyance fixture and is hung, and the lens attaching part which supports and holds the side of one lens by the attaching part prepared in two or more arms combined with the aforementioned suspension section, respectively, and holding the one aforementioned lens.

[Claim 2] The lens maintenance fixture characterized by having the aforementioned arm energized in a lens maintenance fixture according to claim 1 so that the aforementioned lens attaching part may contact the side of the aforementioned lens through an energization means.

[Claim 3] The lens maintenance fixture characterized by providing the following. The 1st arm equipped with the 1st attaching part energized so that the aforementioned lens attaching part may be sharply bent through a coil spring and may contact the side of the aforementioned lens by the aforementioned coil spring in a lens maintenance fixture according to claim 1 at a nose-of-cam side. The 3rd arm equipped with the 3rd attaching part which contacts the side of a lens in which the 1st attaching part of the above contacts, and the side of the side which counters. The 2nd arm equipped with the 2nd attaching part which contacts the lower part side of the aforementioned lens between the sides of the aforementioned lens in which the side and the 3rd attaching part of the above of the aforementioned lens with which the 1st attaching part of the above contacts contact.

[Claim 4] claims 1-3 -- the lens maintenance fixture characterized by not to find each part where the aforementioned attaching part contacts the aforementioned lens on the vertical line passing through the center of the aforementioned lens when two or more aforementioned attaching parts contact the side of a lens, respectively, hold the aforementioned lens and are hung by the conveyance fixture in the aforementioned suspension section in a lens maintenance fixture given in either

[Claim 5] claims 1-4 -- the lens maintenance fixture characterized by for at least one of the aforementioned attaching parts bending a wire to either, and forming it in it in the lens maintenance fixture of a publication

[Claim 6] claims 1-5 -- the lens maintenance fixture characterized by the cross section consisting of almost circular wires in the portion to which at least one arm in two or more aforementioned arms is immersed in either into processing liquid at least in the lens maintenance fixture of a publication

[Claim 7] claims 1-6 -- the lens maintenance fixture characterized by forming the portion to which at least one of the aforementioned attaching parts is equipped with the depression adjacent to the ends edge of the side of a lens, and it contacts the lens of this depression in a lens maintenance fixture given in either in the shape of an edge

[Claim 8] It is a conveyance fixture equipped with the bar by which the suspension section of the shape of a hook of the lens maintenance fixture of a publication is hung on either. claims 1-7 -- The conveyance fixture characterized by having the 1st pitch in which two or more crevices for hooks which insert the suspension section of the shape of an aforementioned hook in the upper surface of the aforementioned bar are established, and the aforementioned crevice for hooks is established for every predetermined interval, and the 1st pitch of the above and the 2nd pitch in which the aforementioned crevice for hooks is established for every another interval.

[Claim 9] claims 1-7 -- the art of the lens characterized by making a lens hold to two or more lens maintenance fixtures given in either, respectively, hanging and hanging the aforementioned suspension section of each lens maintenance fixture to a conveyance fixture, and immersing the aforementioned lens into processing liquid

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the art of the lens maintenance fixture used in order that immersing processing etc. may carry out a lens into processing liquid, such as hard-coat liquid, a conveyance fixture, and such a lens.

[0002]

[Description of the Prior Art] It is performed that a plastics spectacle lens forms the hard-coat film which gives abrasion-proof nature since a blemish tends to be attached. The method of applying hard-coat liquid to the front face of the circular lens with which both sides were processed into the lens by the predetermined lens side configuration as a method of forming a hard-coat film, and drying and stiffening after that is common.

[0003] As a method of applying hard-coat liquid to a lens, there are the spin coat method and a dipping method and a dipping method is in use from productivity.

[0004] The conventional dipping method equips with a lens the lens maintenance fixture which can equip with about 30 lenses collectively, is immersed in a lens the whole lens maintenance fixture into hard-coat liquid, and is pulled up after predetermined time progress, and the method of drying equipping a lens maintenance fixture with a lens is adopted.

[0005] An example of the conventional lens maintenance fixture used for the dipping method is shown in drawing 8. Drawing 8 (a) is the front view of a lens maintenance fixture, and drawing 8 (b) is a side elevation.

[0006] Two trains of lens receptacles 610 of 15 cannons equipped at a battery equipped with Lens L are arranged, and this lens maintenance fixture 600 summarizes a total of 30 lenses L, and can equip now with them. The lens receptacle 610 holds the side of Lens L by the attaching part 630 of three points, and one point has become flat spring-like among those. The lens receptacle 610 is arranged in the pitch for every interval according to the thickness of Lens L etc. The conveyance fixture 620 for conveying the lens maintenance fixture 600 in the lens maintenance fixture 600 is formed in one.

[0007]

[Problem(s) to be Solved by the Invention] However, there were the following troubles in the conventional lens maintenance fixture 600. First, the diameter of a lens must prepare the lens maintenance fixture 600 which has the lens receptacle 610 which exist in 60mm · 80mm, and prepared about nine kinds of lens maintenance fixtures 600 which have the lens receptacle 610 according to each path, in addition was prepared in the pitch of the interval according to the thickness of a lens. [about nine kinds of] Furthermore, although the nose of cam which holds a thin lens comparatively shows the lens maintenance fixture 600 which has the M character-like attaching part 630 by drawing 8, when the side of Lens L is thick, it is necessary to use the lens maintenance fixture 600 which has the attaching part 630 which sharpened needlelike. For this reason, the lens maintenance fixture of varieties must be prepared very much, and there is a trouble that the installation cost for it is large and management becomes complicated.

[0008] Moreover, since it is necessary to choose a lens maintenance fixture according to the path of a lens, or the thickness of a lens, there is a trouble of the fine judgment work of a lens being required and requiring time and effort complicated for the reason. With the special order lens (it is called a pair article) of the eye of right and left for one person, with a lens on

either side, since one lens maintenance fixture cannot be equipped with a pair article when frequencies differ extremely, the diameter of a lens, or, there is a trouble that the time and effort of pairing which another lens maintenance fixture will be equipped [pairing] with a pair article, respectively, therefore makes a pair article join in a manufacturing process behind is required.

[0009] Moreover, the conventional lens maintenance fixture 600 has many skeletons supporting lens receptacles 610 other than lens receptacle 610, and since hard-coat liquid adheres also to these skeletons when flooding with hard-coat liquid, hard-coat liquid becomes useless and it has a trouble of a low in the use efficiency of hard-coat liquid.

[0010] Furthermore, since the lens receptacle is densely arranged by 15 cannons equipped at a battery, in case it equips with a lens, there are workability of being easy to attach a blemish to a lens, and a trouble of the yield.

[0011] Especially, the custom-made items of a lens increase in number, and it becomes many forms and a small lot, and the filling factor of the lens with which a lens maintenance fixture is equipped is low, and these troubles are becoming remarkable in recent years.

[0012] this invention was made in view of the above-mentioned situation, cancels the trouble of the conventional lens maintenance fixture, and aims at offering the lens maintenance fixture which can respond to many forms and a small lot.

[0013] Moreover, this invention aims at offering the conveyance fixture which can convey the lens maintenance fixture which can respond to these many forms and a small lot.

[0014] Furthermore, this invention aims at offering the art of the lens with which immersing processing etc. carries out the lens of many forms and a small lot.

[0015]

[Means for Solving the Problem] It has the suspension section which hangs invention according to claim 1 on a conveyance fixture in order to attain the above-mentioned purpose, and is hung, and the lens attaching part which supports and holds the side of one lens by the attaching part prepared in two or more arms combined with the aforementioned suspension section, respectively, and the lens maintenance fixture characterized by holding the one aforementioned lens is offered.

[0016] Such a lens maintenance fixture is equivalent to the structure which separated and hung every one lens receptacle of the conventional lens maintenance fixture, considered as the lens attaching part of a formula, and also used the conveyance fixture as another object. Since it is a leaf type whenever it holds one lens with one lens maintenance fixture, if the lens maintenance fixture according to the kind of lens is prepared, the lens of varieties can be held with a lens maintenance fixture, respectively, and it can hang to one conveyance fixture, and can flood with hard-coat liquid etc. Therefore, it can respond to many forms and a small lot. Moreover, since it is a hanging formula, there are few amounts to which hard-coat liquid adheres in addition to a lens, and its use efficiency of hard-coat liquid is high. Moreover, since one lens maintenance fixture can be equipped with one lens and it can work using large space, the mistake which attaches a blemish to a lens also decreases. Furthermore, a lens attaching part will not be depended on the diameter of a lens, if it enables it to correspond to the difference in the path of a lens, but since it is possible to hold the lens of varieties with one kind of lens maintenance fixture, the judgment work of a lens also becomes easy.

[0017] Invention according to claim 2 offers the lens maintenance fixture characterized by the aforementioned lens attaching part having the aforementioned arm energized so that the side of the aforementioned lens may be contacted through an energization means in a lens maintenance fixture according to claim 1.

[0018] Since, as for such a lens maintenance fixture, an attaching part has the arm energized by the lens side through the energization means, the movable range of an attaching part is wide, and this can be held corresponding to the lens of a broad path.

[0019] Invention according to claim 3 is set to a lens maintenance fixture according to claim 1. the aforementioned lens attaching part The 1st arm equipped with the 1st attaching part energized so that it may be sharply bent through a coil spring and the side of the aforementioned lens may be contacted by the aforementioned coil spring at a nose-of-cam side, The 3rd arm equipped with the 3rd attaching part which contacts the side of a lens in which

the 1st attaching part of the above contacts, and the side of the side which counters, The lens maintenance fixture characterized by having the 2nd arm equipped with the 2nd attaching part which contacts the lower part side of the aforementioned lens between the sides of the aforementioned lens in which the side and the 3rd attaching part of the above of the aforementioned lens with which the 1st attaching part of the above contacts contact is offered. [0020] While the 3rd attaching part of the 3rd arm can hold the lens side of the other side, the 2nd attaching part of the 2nd arm holds the lower lens side and the 1st attaching part of the 1st arm can hold the lens side stably by three-point support, the movable range of the 1st attaching part is wide, and can hold this corresponding to the lens of a broad path.

[0021] invention according to claim 4 -- claims 1-3 -- in a lens maintenance fixture given in either, when two or more aforementioned attaching parts contact the side of a lens, respectively, hold a lens and are hung by the conveyance fixture in the aforementioned suspension section, the lens maintenance fixture characterized by not finding each part where the aforementioned attaching part contacts a lens on the vertical line passing through the center of a lens is offered

[0022] When the contact of an attaching part and a lens was on the vertical line passing through the center of a lens and a lens is pulled up from hard-coat liquid, the hard-coat liquid which drips from a lens and falls passes along an attaching part, and there is a possibility that the liquid membrane on the front face of a lens can draw near to an attaching part, and a uniform hard-coat film may not be formed in a lens front face.

[0023] invention according to claim 5 -- claims 1-4 -- the lens maintenance fixture characterized by for at least one of the aforementioned attaching parts bending a wire to either, and forming it in it in the lens maintenance fixture of a publication is offered

[0024] Moreover, the attaching part which bent the wire and was formed can have a small touch area with the lens side, and there are few possibilities of doing influence to the processing liquid adhering to the lens front face since [that a surface area is small] there is little adhesion of processing liquid, and the liquid membrane on the front face of a lens can draw near to an attaching part, and can suppress barring formation of a uniform paint film as much as possible.

[0025] invention according to claim 6 -- claims 1-5 -- the lens maintenance fixture characterized by the portion to which at least one arm in two or more aforementioned arms is immersed in either into processing liquid at least in the lens maintenance fixture of a publication consisting of wires with an almost circular cross section is offered

[0026] The arm by which the cross section is constituted from an almost circular wire has little coating weight of processing liquid, and, moreover, is easy to wash.

[0027] invention according to claim 7 -- claims 1-6 -- in a lens maintenance fixture given in either, the aforementioned attaching part is equipped with the depression adjacent to the ends edge of the side of a lens, and the lens maintenance fixture characterized by forming the portion which contacts the lens of this depression in the shape of an edge is offered

[0028] By making into the shape of an edge the nose of cam of the depression which contacts so that the side of the lens of an attaching part may be inserted, and making a touch area into the minimum, the liquid membrane on the front face of a lens can draw near to an attaching part, and can suppress barring formation of a uniform paint film as much as possible.

[0029] It is a conveyance fixture equipped with the bar by which the suspension section of the shape of a hook of the lens maintenance fixture of a publication is hung on either. invention according to claim 8 -- claims 1-7 -- The conveyance fixture characterized by having the 1st pitch in which two or more crevices for hooks which insert the suspension section of the shape of an aforementioned hook in the upper surface of the aforementioned bar are established, and the aforementioned crevice for hooks is established for every predetermined interval, and the 1st pitch of the above and the 2nd pitch in which the aforementioned crevice for hooks is established for every another interval is offered.

[0030] By choosing the crevice for hooks of a suitable pitch as the 1st pitch and the 2nd pitch from which a pitch differs according to the thickness of a lens, and hanging the suspension section of the shape of a hook of a lens attaching part, it becomes possible to choose the crevice for hooks according to the thickness of a lens, and to hang a lens maintenance fixture on a

conveyance fixture easily.

[0031] invention according to claim 9 -- claims 1-7 -- a lens is made to hold to two or more lens maintenance fixtures given in either, respectively, the aforementioned suspension section of each lens maintenance fixture is hung and hung to a conveyance fixture, and the art of the lens characterized by immersing the aforementioned lens into processing liquid is offered

[0032] According to the art of this lens, by preparing the lens maintenance fixture corresponding to the path of a lens, or the thickness of a lens, enable mixed loading of the lens of varieties in one conveyance fixture, and it can consider as the art of the lens which was suitable at many forms and the small lot production.

[0033]

[Embodiments of the Invention] Hereafter, although the gestalt of operation of the art of the lens maintenance fixture of this invention, a conveyance fixture, and a lens is explained, this invention is not limited to the gestalt of the following operations.

[0034] Drawing 1 is the perspective diagram showing the state where the plurality of the 1st operation gestalt of the lens maintenance fixture of this invention was hung and hung in 1 operation gestalt of a conveyance fixture. Drawing 2 is front view of the lens maintenance fixture simple substance of the 1st operation gestalt which contains a cross section in part. Drawing 3 is a perspective diagram which has arranged the 2nd arm and the 3rd arm of a lens maintenance fixture simple substance of the 1st operation gestalt to the front.

[0035] As shown in drawing 1, the lens maintenance fixture 1 and the conveyance fixture 10 of this invention are made into the lens attaching part 2 of a simple substance which separates every one lens receptacle of the conventional lens maintenance fixture, and holds a lens, also use the conveyance fixture 10 as another object, and have structure which formed the suspension section 3 hung and hung to the conveyance fixture 10 in the lens attaching part 2 upper part.

[0036] As for the lens maintenance fixture 1, the whole consists of stainless steels. As shown in drawing 2, it has the hook 30 of the shape of a hook as the suspension section 3 supporting the lens maintenance fixture 1 whole which hangs on the conveyance fixture 10 and is hung. It is a little thick and the hook 30 is broad so that it may not shake, when it hangs on the conveyance fixture 10, and the inside is formed so that it may be fitted in and stabilized in cross-section abbreviation rectangle-like the upper surface and left and right laterals of the crevice for hooks which are not shown in drawing 1 of the bar 16 of the conveyance fixture 10.

[0037] It branched horizontally to the soffit of a hook 30, and has combined with the 1st arm 21 on the left-hand side of drawing 2, and the 2nd arm 22 on the right-hand side of drawing 2 at it. One 1st arm 21 is a wire-like, and is turned up by the acute angle through the coil spring 212 as an energization means in the horizontal shell lower part from the 1st horizontal level 211 prolonged mostly horizontally. The 1st ramp 213 which is turned up and inclines toward the drawing 2 right-hand side slanting lower part is bent a little inside from the perpendicular direction in the drawing 2 right-hand side upper part position of Lens L, and turns into the 1st vertical section 214 which inclines toward left-hand side a little, and is prolonged from the perpendicular direction, and the nose of cam is located near the central-site side of Lens L. The 1st attaching part 41 which contacts the right lateral of Lens L at the inside side of the point of the 1st vertical section 214 is attached in one.

[0038] The almost horizontal rectangle board 221 with which the 2nd arm 22 of another side is thick is formed in hook 30 soffit at a hook 30 and one, and further, the band-like board 222 turns a field to a lens side, and is joined to the edge of the rectangle board 221 in the perpendicular direction. The band-like board 222 is symmetrically bent by the rectangle board 221 and the acute angle with the 1st ramp 213 in rectangle board 221 lower part in a left-hand side slanting lower part, and the 2nd ramp 223 which inclines toward the drawing 2 left-hand side slanting lower part is formed. These 1st arm 21 and 2nd arm 22 are mostly bent by the coplanar. The 2nd ramp 223 intersects the 1st ramp 213 of the 1st arm 21 by the coplanar mostly, is bent [in the drawing 2 left-hand side upper part position of Lens L] a little from the perpendicular direction inside, and is the 2nd vertical section 224 which inclines toward right-hand side a little, and is prolonged from the perpendicular direction. As shown in drawing 2 and drawing 3, in the upper part of the 2nd vertical section 224, the

band-like board 222 was carried out in the perpendicular direction 2 ****s focusing on the crosswise simultaneously, and has branched as the 3rd arm 23. The 2nd vertical section 224 of the 2nd arm 22 is bent toward Lens L side under the drawing 2 left-hand side slant of Lens L, and turns into the 3rd ramp 225, and the 2nd attaching part 42 which contacts the lens L side at the inside at the nose of cam of the 3rd ramp 225 is attached in one. Eccentricity of the 2nd attaching part 42 nose of cam is carried out from the vertical line VL passing through the center of a lens, and it contacts the lower part side of the left-hand side lens L a little.

[0039] The 2nd arm 22 and the 3rd branched arm 23 are prolonged in the 2nd vertical section 224 upper part of the 2nd arm 22 almost in parallel with the 2nd vertical section 224 of the 2nd arm 22, and the nose of cam is arranged in the position which reaches near the central left-hand side side of Lens L. The 3rd attaching part 43 is formed in the inside at the nose of cam of the 3rd arm 23 at one, and the nose of cam of the 3rd attaching part 43 contacts the side at the left end of lens L.

[0040] the long and slender guidance along which the 1st arm 21 passes along a crosswise center in the 2nd ramp 223 of the band-like board 222 which intersects the 1st arm 21 of the 2nd arm 22 as shown in drawing 2 and drawing 3 -- a hole 226 punctures -- having -- guidance -- the hole 226 lets the 1st ramp 213 of the 1st arm 21 pass

[0041] The 1st attaching part 41 at the nose of cam of the 1st arm 21 is energized so that it may go to a lens L center side by the energization force of a coil spring 212. therefore, as shown in drawing 2, Lens L is the 2nd attaching part 42 about the downward side, and receives the left-hand side side by the 3rd attaching part 43, respectively -- having -- right-hand side -- the 1st attaching part 41 at the nose of cam of the 1st arm presses the upper part side a little, and it is held by the three point suspension of these 1st attaching part 41, the 2nd attaching part 42, and the 3rd attaching part 43

[0042] An example of an attaching part is shown in drawing 6. When the side of Lens L is thick, as shown in drawing 6 (a), Lens L is pinched by three attaching parts by using the tabular attaching part 401 in which the nose of cam sharpened needlelike, and pressing the sharp nose of cam on the side of Lens L. The lens maintenance fixture 1 shown in drawing 3 is equipped with the tabular attaching part 401 holding the lens L which is thick in this way. When the thickness of the side of Lens L is thin, as shown in drawing 6 (b), the M type-like tabular attaching part 402 is used for a nose of cam. When V rabbit-ear 402a at the nose of cam of the M type-like tabular attaching part 402 contacts the edges on both sides of the side of Lens L, as it dents and 402a sandwiches the side of Lens L, it is pinched by three attaching parts. The lens maintenance fixture 1 shown in drawing 1 and drawing 2 is equipped with such an attaching part 402.

[0043] The nose of cam of depression 402a of the tabular attaching part 402 shown in drawing 6 (b) is formed in edge-like 402b, and lessens area in contact with the lens L side as much as possible. The liquid membrane of the hard-coat liquid formed in the about 402 tabular attaching part lens L front face could draw near to the tabular attaching part 402 by this, and the thickness of the hard-coat film near [where the tabular attaching part 402 contacted] the lens L front face has prevented the bird clapper thinly.

[0044] since the 1st arm 21 is turned up by the acute angle through a coil spring 212, and the lens maintenance fixture 1 shown in drawing 2 and drawing 3 can take the long stroke from the supporting point of a coil spring 212 to the 1st attaching part 41 and can make [many] the amount of bending of a spring -- the 1st arm 21 -- the side of Lens L -- receiving -- alienation -- the movable range which approaches is large Therefore, it can respond to the outer diameter of the lens of the large range. For example, the outer diameter of a lens has nine kinds of 2-3mm serration in 60-80mm. Conventionally, every [this] nine kinds, although the lens maintenance fixture was required, since the movable range of the 1st arm 21 is wide, with the lens maintenance fixture 1 of this operation form, the range of 60-80mm can be covered with two kinds of lens maintenance fixtures 1. Consequently, two kinds of the tabular attaching parts 401 and 402 corresponding to the thickness of the lens shown in drawing 6 (a) and (b) are added, and all the present lenses can be mostly covered with four kinds of lens maintenance fixtures 1.

[0045] It is not necessary to prepare the lens maintenance fixture 1 of varieties, an

installation cost is reduced by this, and management also becomes simple by it. And the work classified for every path of a lens becomes simple, and productivity improves. Since possibility that a pair article can also be processed together with one conveyance fixture is high, the complicatedness of pairing also decreases.

[0046] moreover, the 1st ramp 213 of the 1st arm 21 -- guidance of the 2nd arm 22 -- the 2nd ramp 223 of the 2nd arm 22 is intersected through a hole 226 thereby -- the lens L side of the 1st arm 21 -- receiving -- alienation -- the movement which approaches -- guidance of the 2nd arm 22 -- it is restricted by the hole 226, a bird clapper is secured almost identically to the virtual flat surface in which the 2nd arm 22 bends and the movement on the flat surface of the 1st arm 21 is formed, and torsion arises mutually For this reason, the side of Lens L can be certainly pinched by the 1st attaching part 41 and the 2nd attaching part 42.

[0047] Moreover, the 2nd attaching part 42 supporting the lower part of Lens L is in the position which carried out eccentricity from the vertical line VL passing through a lens L center, and shifted to the left about about 10mm, when the part which is in contact with the side of a lens hangs the lens maintenance fixture 1 by the hook 30 to the conveyance fixture 10, as shown in drawing 2 .

[0048] In case Lens L will be pulled up after flooding with hard-coat liquid if the contact position to the side of the lens L of the 2nd attaching part 42 is on the vertical line VL passing through a lens L center, hard-coat liquid can draw near to the 2nd attaching part 42 from a lens L front face, and it is admitted experientially that a tree-like stripe occurs.

[0049] In the lens maintenance fixture 1 of this operation form, since the contact position of the 2nd attaching part 42 is carrying out eccentricity from on the vertical line VL passing through a lens center, generating of the stripe of the shape of such a tree can be suppressed.

[0050] Moreover, in the lens maintenance fixture 1 of this operation form, as shown in drawing 3 , the 2nd arm 22 of the perpendicular direction is divided perpendicularly, and the 3rd arm 23 branches, is prepared, and arranges in parallel the 2nd arm 22 and the 3rd arm 23 in the thickness direction of Lens L. Consequently, it has structure without what mediates between the 2nd arm 22 and the lens L side in addition to 2nd attaching part 42. It has similarly structure without what touches the lens L side in addition to 1st attaching part 41 and 3rd attaching part 43, respectively about the 1st arm 21 and the 3rd arm 23. Therefore, in case it is immersed and a lens is pulled up in hard-coat liquid, the film of hard-coat liquid is formed between the lens L side, and these 1st arm 21, the 2nd arm 22 and the 3rd arm 23. If the film of hard-coat liquid is formed, although the drop which burst when a film burst will adhere to a lens and will become a poor cause of generating, in the lens maintenance fixture 1 of this operation form, it has structure which such a defect cannot produce easily.

[0051] The work which makes Lens L hold to the lens maintenance fixture 1 For example, draw near to the rectangle board 221 side of the 2nd arm 22 with a finger the 1st ramp 213 which has become the 2nd arm 22 of the 1st arm 21, and aslant after intersection, and the 1st arm 21 is opened greatly. What is necessary is making it just make the 1st attaching part 41 at the nose of cam of the 1st arm 21 contact the lens L side according to the energization force of a coil spring 212, after making the side of Lens L contact the 2nd attaching part 42 and the 3rd attaching part 43.

[0052] Since Lens L can be made to hold to the lens maintenance fixture 1 by such work, unlike the work which equips the slit of the lens receptacle 610 of the conventional lens maintenance fixture 600 with Lens L, a possibility of attaching a blemish to Lens L can be small, and can raise the yield.

[0053] Moreover, since it is breakage of the lens maintenance fixture 1 for one lens when the lens maintenance fixture 1 is damaged, unlike the lens maintenance fixture 500 equipped with 30 conventional lenses, there is an advantage with which there is little loss and it can be managed.

[0054] Next, the 2nd operation form of the lens maintenance fixture of this invention is explained, referring to drawing 4 · drawing 6 . The perspective diagram which looked at drawing 4 from the transverse-plane side of a lens maintenance fixture, and drawing 5 are the perspective diagrams seen from front slant.

[0055] To the lens maintenance fixture 1 of the 1st operation form, lens maintenance fixture

1b of the 2nd operation form enables uniform adhesion of hard-coat liquid to the lens side by improvement of an attaching part, and improves washing nature further.

[0056] The whole consists of stainless steels and this lens maintenance fixture 1b has hook 30b as suspension section 3b supporting the whole lens maintenance fixture 1b, and lens attaching part 2b combined with this hook 30b by hanging and hanging at the topmost part at the bar 16 of the conveyance fixture 10. Hook 30b has supporter 31b and this which have the configuration of a reverse concave which bent the thick rectangle board a little, was formed, and was formed so that it might be fitted in and stabilized in cross-section abbreviation rectangle-like the upper surface and left and right laterals of the crevice for hooks which are not shown in drawing 1 of the bar 16 of the conveyance fixture 10, and horizontal plate 32b currently formed in one.

[0057] The end face section is combined with horizontal plate 32b of hook 30b b, respectively, and lens attaching part 2b has 1st arm 21b from which the point is the free end, 2nd arm 22b, and 3rd arm 23b. These 1st arm 21b, 2nd arm 22b, and 3rd arm 23b consist of wires with an almost circular cross section fundamentally.

[0058] The end face section of 1st arm 21b is joined to the upper surface of horizontal plate 32b of hook 30b by this and parallel. From 1st horizontal-level 211b horizontally extended from the end face section, it is turned up by the acute angle through coil-spring 212b as an energization means in the horizontal shell slanting lower part. It is set to 1st vertical section 214b which 1st ramp 213b which is turned up and inclines toward the drawing 4 diagonal right side is bent a little inside a little than the perpendicular direction on the right-hand side from the right-hand side edge of Lens L, inclines toward left-hand side a little from the perpendicular direction, and is extended, and the nose of cam is located near the central right lateral of Lens L. The point of 1st arm 21b is flatly formed with a press etc., attachment section 215b is formed, and the end face section of 1st attaching part 41b which bent the narrow wire and was formed is joined to attachment section 215b. The portion which starts from the end face section of 1st attaching part 41b is mostly located in the nose-of-cam edge of 1st arm 21b.

[0059] The end face section is joined to the horizontal plate 32b undersurface of hook 30b through the guide plate 24 with which the cross section was formed in omega type, respectively, and, as for 2nd arm 22b and 3rd arm 23b, 1st arm 21b has the 1st horizontal level 221b and 231b currently extended to the reverse drawing right horizontal direction from the end face section. It is sharply bent toward a left-hand side slanting lower part from these 1st horizontal level 221b and 231b, and the 2nd ramp 222b and 232b currently extended to the method of this diagonal below intersects 1st arm 21b so that 1st ramp 213b of 1st arm 21b b may be inserted from both sides. It is bent a little rightward a little than the perpendicular direction on the left-hand side from the left end of the 2nd ramp 222b and 232b to the lens L, and has become the 2nd vertical sections 223b and 233b which incline toward right-hand side a little from the perpendicular direction. 2nd arm 22b is further bent toward a right-hand side lower part by the lens L diagonal below side, and turns into 3rd ramp 224b, further, it is bent so that it may go to a lens L center side, and attachment section 225b is formed. attachment section 225b at the nose of cam of 2nd arm 22b -- the side of a lens L lower part -- it is located a little near the left-hand side 2nd attaching part 42b is joined to attachment section 225b of 2nd arm 22b b. The nose of cam which showed 2nd attaching part 42b to drawing 6 (b) is the M type-like tabular attaching part 402. The nose of cam of 2nd vertical section 232b of 3rd arm 23b is extended so that it may be located near the lens L central left lateral. The point of 2nd vertical section 233b of 3rd arm 23b is flatly formed with a press etc., attachment section 235b is formed, and the end face section of 3rd attaching part 43b which bent the wire and was formed is joined to attachment section 235b. The portion which starts from the end face section of 3rd attaching part 43b is mostly located in the nose-of-cam edge of 3rd arm 23b. The upper part of each 2nd vertical section 223b and 233b of 2nd arm 22b and 3rd arm 23b is being mutually fixed by the connecting plate 25 so that each 2nd vertical section 223b and 233b of 2nd arm 22b and 3rd arm 23b may be parallel mostly with the side of Lens L. it is shown in drawing 5 -- as -- the [1st arm 21b, 2nd arm 22b, and] -- 3 arm 23b is bent so that it may be parallel mostly with the side of Lens L

[0060] 1st attaching part 41b and 3rd attaching part 43b which are attached in lens maintenance fixture 1b of the 2nd operation gestalt are the wire-like attaching part 404 which bent the narrow wire and was formed, as shown in drawing 6 (d). The wire-like attaching part 404 has ***** 404a that a wire should bend in the shape of ***** so that the side contacts each ends edge of the both-sides side of right and left of thin lens L. Connection 404b which connects this ***** 404a to the end face section joined to each attachment section 215b and 235b of 1st arm 21b and 3rd arm 23b starts from the nose-of-cam edge of each attachment section 215b and 235b, and is extended in the side of Lens L, and the direction from which it separated. In lens maintenance fixture 1b shown in drawing 4 and drawing 5, 1st attaching part 41b and 3rd attaching part 43b are the wire-like attaching parts 404 shown in this drawing 6 (d), and although 2nd attaching part 42b was the tabular attaching part 402 shown in drawing 6 (b), 2nd attaching part 42b is also good also as a wire-like attaching part 404. When the side is a thick lens, as shown in drawing 6 (c), the needlelike wire-like attaching part 403 in which the nose of cam of a wire sharpened, respectively is used for 1st attaching part 41b, 2nd attaching part 42b, and 3rd attaching part 43b.

[0061] Lens maintenance fixture 1b of the 2nd operation gestalt is 1st attaching part 41b and 3rd attaching part 43b about the right-and-left both-sides side of Lens L, and holds the side of the lower part of Lens L by 2nd attaching part 42b. Since fundamental composition is almost the same as the lens maintenance fixture 1 of the 1st operation gestalt, lens maintenance fixture 1b of the 2nd operation gestalt has the same effect as the lens maintenance fixture 1 of the 1st operation gestalt.

[0062] That is, 1st arm 21b was sharply bent through coil-spring 212b, and since the movable range is wide, while it is long, and the stroke of 1st attaching part 41b can respond to the outer diameter of the lens L of the large range, a possibility of attaching a blemish during the work equipped with Lens L at a lens has decreased. Moreover, since the part which is in contact with the side of the lens L of 2nd attaching part 42b is located in the position which carried out eccentricity from the vertical line VL passing through the center of Lens L when it hangs lens maintenance fixture 1b to the conveyance fixture 10, there is no possibility of processing liquid being able to draw near to 2nd attaching part 42b, and making the thickness of the liquid membrane of the processing liquid of a lens L front face producing an ununiformity.

[0063] Moreover, 1st ramp 213of 1st arm 21b b is inserted with 2nd ramp 222of 2nd arm 22b b, and 2nd ramp 232of 3rd arm 23b b, and crosses. thereby -- the lens L side of 1st arm 21b -- receiving -- alienation -- so to speak, 2nd ramp 232of 2nd ramp 222of 2nd arm 22b b and 3rd arm 23b b regulates the movement which approaches as guidance, and the bird clapper is mostly secured to parallel for the movement on the flat surface of 1st arm 21b with the side of Lens L

[0064] lens maintenance fixture 1b of the 2nd operation form -- these effects -- in addition, 1st arm 21b, 2nd arm 22b, and 3rd arm 23b -- a cross section -- it consists of circular wires and a surface area becomes the minimum Therefore, there is little coating weight of hard-coat liquid, and since an affix moreover ***** simply by washing, the effect that it can wash easily is added. Moreover, since 1st attaching part 41b and 3rd attaching part 43b are the wire-like attaching parts 404 which bend a narrow wire and are formed, There is less coating weight of processing liquid than the tabular attaching part 402 shown in drawing 6 (b). Therefore, a possibility of hard-coat liquid being able to draw near to 1st attaching part 41b and 3rd attaching part 43b, and making the thickness of the liquid membrane of the processing liquid of a lens L front face producing an ununiformity decreases, and it is admitted that the yield in hard-coat processing improves notably. Moreover, the coating weight of hard-coat liquid decreases by having changed the tabular attaching part 401 shown in drawing 6 (a) into the wire-like attaching part 403 drawing 6 (c) Shown.

[0065] Furthermore, lens maintenance fixture 1b of the 2nd operation form has structure which cannot do the film of hard-coat liquid further easily from the lens maintenance fixture 1 of the 1st operation form. That is, the film of hard-coat liquid might arise between the tabular attaching part 402 which consists of metal plates with which the 1st attaching part 41

and the 3rd attaching part 43 of the lens maintenance fixture 1 of the 1st operation form have started from the position which kept its distance a little on slant, and are bent from the nose-of-cam edge of the 1st arm 21 and the 3rd arm 23, respectively, this, and the side of the lens L which has countered. on the other hand, in lens maintenance fixture 1b of the 2nd operation form 1st attaching part 41b The thing of 1st arm 21b for which 3rd attaching part 43b has mostly the structure of 3rd arm 23b of starting from a nose-of-cam edge mostly from the nose-of-cam edge, Wire-like attaching part 404 by having turned to the direction where connection 403b connected with ***** 404a which goes away tends toward the side of Lens L, and a different direction It is hard to produce the film of hard-coat liquid with high viscosity between the lens L side and attaching parts 41b and 43b, and poor generating by membranous burst has stopped being able to happen easily.

[0066] These 1st operation forms reach lens maintenance fixture 1, and, as for lens maintenance fixture 1b of the 2nd operation form, the 1st arm 21 and 21b energizes the 1st attaching part 41 and 41b at a nose of cam to Lens L side by the energization force of coil-spring 212,212b, respectively. Therefore, it is possible to change the spring pressure of coil-spring 212,212b by making thick the wire size of the 1st arm 21 and 21b which constitutes coil-spring 212,212b, for example, or making it thin. For example, by making thin the wire size of the 1st arm 21 and 21b, spring pressure is decreased and it becomes possible to hold without also making the un-circular lens with which the periphery edge became thin transform. That is, this un-circular lens is a thin shape lens which deleted the whole thickness equally, when there is hope of the customer who wants to make thickness (inside web thickness) of a lens thin. With a convex lens (lens of + range), the periphery section especially becomes thin, and the periphery section is deleted and it may become an ellipse form and a non-round shape. The periphery edge of the un-circular lens with which the periphery section was deleted is sharp like [it is thin and] the edge of a blade, and when heat is applied in the state where it inserted from both sides by the strong force, there is a possibility of producing deformation. In the lens maintenance fixtures 1 and 1b of this invention, such an un-circular lens can also be held by changing the spring pressure of coil-spring 212,212b.

[0067] Next, the conveyance fixture of this invention which conveys the lens maintenance fixtures 1 and 1b of this invention is explained. As shown in drawing 1, the conveyance fixture 10 is the direction where shaft orientations and the alignment boards 12 and 13 of a rectangle tabular cross at right angles on the ends edge of the main shaft rod 11, and is horizontally formed in one, and it is formed in one so that the cross-section [of V characters]-like delivery board 14 may insert the main shaft rod 11 from the bottom inside both sides from the alignment boards 12 and 13 of the main shaft rod 11. Furthermore, the fishing rod 15 of the perpendicular direction is formed in one on the inner direction undersurface of the both sides of the delivery board 14 of the main shaft rod 11, and the bar 16 is mostly formed in parallel with the main shaft rod 11 at this fishing rod 15 and one. Two or more lens maintenance fixtures 1 and 1b can be collectively conveyed by hanging and hanging the hooks 30 and 30b of the lens maintenance fixtures 1 and 1b to this bar 16.

[0068] The side elevation of 1 operation form of the conveyance fixture 10 is shown in drawing 7. Drawing 7 shows the array of the crevice 17 for hooks established in the bar 16. The inside of the hooks 30 and 30b of the lens attaching part 1 is inserted in, this crevice 17 for hooks is fixed, and 20 crevices 17 for hooks are formed with this conveyance fixture 10 from the crevice 17-1 for the 1st hook of the leftmost of drawing 7 to the rightmost crevice 17-20 for the 20th hook. A little broad heights are prepared between the crevice 17-1 for the 1st hook, and the next crevice 17-2 for the 2nd hook. The crevice 17-2 for the 2nd hook, the next crevice 17-3 for the 3rd hook and the crevice 17-3 for the 3rd hook, and the crevice 17-4 for the 4th hook are separated by the narrow heights which divide the crevice for hooks mutually. Furthermore, it is separated by comparatively broad heights by the crevice 17-4 for the 4th hook, and the next crevice 17-5 for the 5th hook like the interval of the crevice 17-1 for the 1st hook, and the crevice 17-2 for the 2nd hook. They are 3 cannons equipped at a battery from the crevice 17-6 for the 6th hook up to the crevice 17-8 for the 8th hook like the crevice 17-2 for the 2nd hook to the crevice 17-4 for the 4th hook. The same array as the crevice 17-1 for the 1st hook to the 17

to concave 4 section for the 4th hook is henceforth repeated from the crevice 17-5 for the 5th hook.

[0069] The crevice 17-2 for the 2nd hook of 3 cannons equipped at a battery - the crevice 17-4 for the 4th hook are formed at intervals of Pitch a, respectively. The pitch between the crevice 17-1 for the 1st hook and the crevice 17-2 for the 2nd hook is the pitch b of the pitch of the double precision of Pitch a, and between the crevice 17-4 for the 4th hook and the crevices 17-5 for the 5th hook is the interval of Pitch b between the crevice 17-2 for the 2nd hook, and the crevice 17-4 for the 4th hook. On the other hand, since the pitch between the crevice 17-1 for the 1st hook and the crevice 17-3 for the 3rd hook is the pitch $b + \text{pitch } a$, it is the pitch c of a 3 times as many pitch as Pitch a, and the pitch between the crevice 17-3 for the 3rd hook and the crevice 17-5 for the 5th hook is also Pitch c. For example, Pitch a is [20mm and Pitch c of 10mm and Pitch b] 30mm.

[0070] Namely, the conveyance fixture 10 of this operation gestalt can choose now Pitch b or Pitch c with the thickness of a lens. For example, when hanging the lens maintenance fixtures 1 and 1b holding the thin lens of the thickness of a lens on the conveyance fixture 10 When hanging in Pitch b and hanging the lens maintenance fixtures 1 and 1b with the thick thickness of a lens which carried out lens maintenance, the maximum lens number of sheets according to the thickness of a lens can be easily set to the conveyance fixture 10 by choosing and hanging Pitch c, without contacting both lenses. Moreover, it is also possible while choosing and hanging Pitch b to load together the lens of the thickness of a different lens and to set to the conveyance fixture 10 by choosing Pitch c and hanging a lens with the thick thickness of a lens.

[0071] The conveyance fixture 10 of this operation gestalt did not put the crevice 17 for hooks in order at equal intervals, but it arranges the crevice 17 for hooks at intervals of an inequality so that a pitch can be chosen easily.

[0072] Next, operation is explained although the lens maintenance fixtures 1 and 1b and the conveyance fixture 10 were combined. As shown in drawing 1, the lens maintenance fixtures 1 and 1b which were made to hold Lens L to the lens maintenance fixtures 1 and 1b of this invention, and held Lens L can be hung on the bar 16 of the conveyance fixture 10 of this invention, and various processings can be performed to the hung lens L.

[0073] For example, before hard-coat processing, it conveys to pretreatment tubs, such as an alkali treatment, acid treatment, and a pure water washing tub, Lens L is immersed in these pretreatment tubs one by one, and a lens side is washed.

[0074] Next, the conveyance fixture 10 is conveyed to a hard-coat processing tub, the alignment boards 12 and 13 of the conveyance fixture 10 are inserted in a position arrangement crevice, and it carries out being predetermined-time immersed of the lens L which the conveyance fixture 10 is dropped and is held with the lens maintenance fixtures 1 and 1b into hard-coat liquid. Then, a conveyance fixture is pulled up at a predetermined raising speed, and the liquid piece of the hard-coat liquid adhering to Lens L is carried out. Then, the conveyance fixture 10 is conveyed to a drying furnace, and the hard-coat liquid adhering to Lens L and the lens maintenance fixtures 1 and 1b is dried.

[0075] Next, the lens L to which the hard-coat film dried, for example has adhered can be removed from the lens maintenance fixtures 1 and 1b, Lens L can be calcinated by the firing furnace, a hard-coat film can be stiffened, and the hard-coat film which gives abrasion-proof nature can be formed in a lens front face.

[0076] Thus, since the lens L of varieties can be loaded together and processed to the conveyance fixture 10 by combining the lens maintenance fixtures 1 and 1b and the conveyance fixture 10 of this invention, corresponding to many forms and a small lot, a lens can be processed efficiently.

[0077] Moreover, Lens L is made to hold with the lens maintenance fixtures 1 and 1b of this invention, the lens maintenance fixtures 1 and 1b are hung on the conveyance fixture 10, and it floods with hard-coat liquid below a connecting plate 25 by lens maintenance fixture 1b of the 2nd operation form below the branch point of the 2nd arm 21 and the 3rd arm 23 with the lens maintenance fixture 1 of the 1st operation form by the method of flooding Lens L with hard-coat liquid. That hard-coat liquid adheres in addition to Lens L The nose of cam of the

1st - the 3rd arm 21, 21b, 22, 22b, 23, and 23b, and the 1st - the 3rd attaching part 41 and 41b, Since hard-coat liquid does not adhere to the skeleton which are 42, 42b, 43, and 43b, and supports these arms 21, 21b, 22, 22b, 23, and 23b the amount in which hard-coat liquid adheres to the lens maintenance fixtures 1 and 1b is markedly boiled as compared with the conventional lens maintenance fixture 600, there are and they end [few] Consequently, while the use efficiency of hard-coat liquid improves, the amount of the detergent used which washes a lens maintenance fixture can also decrease, and a production cost can be reduced.

[0078] In the above-mentioned explanation, although the suspension section is explained as a hook-like hook, it may be a configuration like the shape of the shape of a ring imposed, for example on a lobe, and T character which is imposed on two or more bars. Moreover, the structure which prepared the hook-like lobe is sufficient also as a conveyance fixture, and you may be the structure which arranged the bar in parallel.

[0079]

[Effect of the Invention] Since the lens maintenance fixture of this invention held a lens for every sheet and it was made to hang it to a conveyance fixture separately, it became possible [loading together the lens of varieties to one conveyance fixture efficiently corresponding to many forms and a small lot].

[0080] The conveyance fixture of this invention can set a lens maintenance fixture easily corresponding to the thickness of a lens.

[0081] According to the art of the lens of this invention, since the lens of varieties can be processed collectively, corresponding to many forms and a small lot, a lens can be processed efficiently.

[Translation done.]

* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the art of the lens maintenance fixture used in order that immersing processing etc. may carry out a lens into processing liquid, such as hard-coat liquid, a conveyance fixture, and such a lens.

[0002]

[Description of the Prior Art] It is performed that a plastics spectacle lens forms the hard-coat film which gives abrasion-proof nature since a blemish tends to be attached. The method of applying hard-coat liquid to the front face of the circular lens with which both sides were processed into the lens by the predetermined lens side configuration as a method of forming a hard-coat film, and drying and stiffening after that is common.

[0003] As a method of applying hard-coat liquid to a lens, there are the spin coat method and a dipping method and a dipping method is in use from productivity.

[0004] The conventional dipping method equips with a lens the lens maintenance fixture which can equip with about 30 lenses collectively, is immersed in a lens the whole lens maintenance fixture into hard-coat liquid, and is pulled up after predetermined-time progress, and the method of drying equipping a lens maintenance fixture with a lens is adopted.

[0005] An example of the conventional lens maintenance fixture used for the dipping method is shown in drawing 8. Drawing 8 (a) is the front view of a lens maintenance fixture, and drawing 8 (b) is a side elevation.

[0006] Two trains of lens receptacles 610 of 15 cannons equipped at a battery equipped with Lens L are arranged, and this lens maintenance fixture 600 summarizes a total of 30 lenses L, and can equip now with them. The lens receptacle 610 holds the side of Lens L by the attaching part 630 of three points, and one point has become flat spring-like among those. The lens receptacle 610 is arranged in the pitch for every interval according to the thickness of Lens L etc. The conveyance fixture 620 for conveying the lens maintenance fixture 600 in the lens maintenance fixture 600 is formed in one.

[0007]

[Problem(s) to be Solved by the Invention] However, there were the following troubles in the conventional lens maintenance fixture 600. First, the diameter of a lens must prepare the lens maintenance fixture 600 which has the lens receptacle 610 which exist in 60mm · 80mm, and prepared about nine kinds of lens maintenance fixtures 600 which have the lens receptacle 610 according to each path, in addition was prepared in the pitch of the interval according to the thickness of a lens. [about nine kinds of] Furthermore, although the nose of cam which holds a thin lens comparatively shows the lens maintenance fixture 600 which has the M character-like attaching part 630 by drawing 8, when the side of Lens L is thick, it is necessary to use the lens maintenance fixture 600 which has the attaching part 630 which sharpened needlelike. For this reason, the lens maintenance fixture of varieties must be prepared very much, and there is a trouble that the installation cost for it is large and management becomes complicated.

[0008] Moreover, since it is necessary to choose a lens maintenance fixture according to the path of a lens, or the thickness of a lens, there is a trouble of the fine judgment work of a lens being required and requiring time and effort complicated for the reason. With the special order lens (it is called a pair article) of the eye of right and left for one person, with a lens on

either side, since one lens maintenance fixture cannot be equipped with a pair article when frequencies differ extremely, the diameter of a lens, or, there is a trouble that the time and effort of pairing which another lens maintenance fixture will be equipped [pairing] with a pair article, respectively, therefore makes a pair article join in a manufacturing process behind is required.

[0009] Moreover, the conventional lens maintenance fixture 600 has many skeletons supporting lens receptacles 610 other than lens receptacle 610, and since hard-coat liquid adheres also to these skeletons when flooding with hard-coat liquid, hard-coat liquid becomes useless and it has a trouble of a low in the use efficiency of hard-coat liquid.

[0010] Furthermore, since the lens receptacle is densely arranged by 15 cannons equipped at a battery, in case it equips with a lens, there are workability of being easy to attach a blemish to a lens, and a trouble of the yield.

[0011] Especially, the custom-made items of a lens increase in number, and it becomes many forms and a small lot, and the filling factor of the lens with which a lens maintenance fixture is equipped is low, and these troubles are becoming remarkable in recent years.

[0012] this invention was made in view of the above-mentioned situation, cancels the trouble of the conventional lens maintenance fixture, and aims at offering the lens maintenance fixture which can respond to many forms and a small lot.

[0013] Moreover, this invention aims at offering the conveyance fixture which can convey the lens maintenance fixture which can respond to these many forms and a small lot.

[0014] Furthermore, this invention aims at offering the art of the lens with which immersing processing etc. carries out the lens of many forms and a small lot.

[0015]

[Means for Solving the Problem] It has the suspension section which hangs invention according to claim 1 on a conveyance fixture in order to attain the above-mentioned purpose, and is hung, and the lens attaching part which supports and holds the side of one lens by the attaching part prepared in two or more arms combined with the aforementioned suspension section, respectively, and the lens maintenance fixture characterized by holding the one aforementioned lens is offered.

[0016] Such a lens maintenance fixture is equivalent to the structure which separated and hung every one lens receptacle of the conventional lens maintenance fixture, considered as the lens attaching part of a formula, and also used the conveyance fixture as another object. Since it is a leaf type whenever it holds one lens with one lens maintenance fixture, if the lens maintenance fixture according to the kind of lens is prepared, the lens of varieties can be held with a lens maintenance fixture, respectively, and it can hang to one conveyance fixture, and can flood with hard-coat liquid etc. Therefore, it can respond to many forms and a small lot. Moreover, since it is a hanging formula, there are few amounts to which hard-coat liquid adheres in addition to a lens, and its use efficiency of hard-coat liquid is high. Moreover, since one lens maintenance fixture can be equipped with one lens and it can work using large space, the mistake which attaches a blemish to a lens also decreases. Furthermore, a lens attaching part will not be depended on the diameter of a lens, if it enables it to correspond to the difference in the path of a lens, but since it is possible to hold the lens of varieties with one kind of lens maintenance fixture, the judgment work of a lens also becomes easy.

[0017] Invention according to claim 2 offers the lens maintenance fixture characterized by the aforementioned lens attaching part having the aforementioned arm energized so that the side of the aforementioned lens may be contacted through an energization means in a lens maintenance fixture according to claim 1.

[0018] Since, as for such a lens maintenance fixture, an attaching part has the arm energized by the lens side through the energization means, the movable range of an attaching part is wide, and this can be held corresponding to the lens of a broad path.

[0019] Invention according to claim 3 is set to a lens maintenance fixture according to claim 1. the aforementioned lens attaching part The 1st arm equipped with the 1st attaching part energized so that it may be sharply bent through a coil spring and the side of the aforementioned lens may be contacted by the aforementioned coil spring at a nose-of-cam side, The 3rd arm equipped with the 3rd attaching part which contacts the side of a lens in which

the 1st attaching part of the above contacts, and the side of the side which counters, The lens maintenance fixture characterized by having the 2nd arm equipped with the 2nd attaching part which contacts the lower part side of the aforementioned lens between the sides of the aforementioned lens in which the side and the 3rd attaching part of the above of the aforementioned lens with which the 1st attaching part of the above contacts contact is offered. [0020] While the 3rd attaching part of the 3rd arm can hold the lens side of the other side, the 2nd attaching part of the 2nd arm holds the lower lens side and the 1st attaching part of the 1st arm can hold the lens side stably by three-point support, the movable range of the 1st attaching part is wide, and can hold this corresponding to the lens of a broad path.

[0021] invention according to claim 4 -- claims 1-3 -- in a lens maintenance fixture given in either, when two or more aforementioned attaching parts contact the side of a lens, respectively, hold a lens and are hung by the conveyance fixture in the aforementioned suspension section, the lens maintenance fixture characterized by not finding each part where the aforementioned attaching part contacts a lens on the vertical line passing through the center of a lens is offered

[0022] When the contact of an attaching part and a lens was on the vertical line passing through the center of a lens and a lens is pulled up from hard-coat liquid, the hard-coat liquid which drips from a lens and falls passes along an attaching part, and there is a possibility that the liquid membrane on the front face of a lens can draw near to an attaching part, and a uniform hard-coat film may not be formed in a lens front face.

[0023] invention according to claim 5 -- claims 1-4 -- the lens maintenance fixture characterized by for at least one of the aforementioned attaching parts bending a wire to either, and forming it in it in the lens maintenance fixture of a publication is offered

[0024] Moreover, the attaching part which bent the wire and was formed can have a small touch area with the lens side, and there are few possibilities of doing influence to the processing liquid adhering to the lens front face since [that a surface area is small] there is little adhesion of processing liquid, and the liquid membrane on the front face of a lens can draw near to an attaching part, and can suppress barring formation of a uniform paint film as much as possible.

[0025] invention according to claim 6 -- claims 1-5 -- the lens maintenance fixture characterized by the portion to which at least one arm in two or more aforementioned arms is immersed in either into processing liquid at least in the lens maintenance fixture of a publication consisting of wires with an almost circular cross section is offered

[0026] The arm by which the cross section is constituted from an almost circular wire has little coating weight of processing liquid, and, moreover, is easy to wash.

[0027] invention according to claim 7 -- claims 1-6 -- in a lens maintenance fixture given in either, the aforementioned attaching part is equipped with the depression adjacent to the ends edge of the side of a lens, and the lens maintenance fixture characterized by forming the portion which contacts the lens of this depression in the shape of an edge is offered

[0028] By making into the shape of an edge the nose of cam of the depression which contacts so that the side of the lens of an attaching part may be inserted, and making a touch area into the minimum, the liquid membrane on the front face of a lens can draw near to an attaching part, and can suppress barring formation of a uniform paint film as much as possible.

[0029] It is a conveyance fixture equipped with the bar by which the suspension section of the shape of a hook of the lens maintenance fixture of a publication is hung on either. invention according to claim 8 -- claims 1-7 -- The conveyance fixture characterized by having the 1st pitch in which two or more crevices for hooks which insert the suspension section of the shape of an aforementioned hook in the upper surface of the aforementioned bar are established, and the aforementioned crevice for hooks is established for every predetermined interval, and the 1st pitch of the above and the 2nd pitch in which the aforementioned crevice for hooks is established for every another interval is offered.

[0030] By choosing the crevice for hooks of a suitable pitch as the 1st pitch and the 2nd pitch from which a pitch differs according to the thickness of a lens, and hanging the suspension section of the shape of a hook of a lens attaching part, it becomes possible to choose the crevice for hooks according to the thickness of a lens, and to hang a lens maintenance fixture on a

conveyance fixture easily.

[0031] invention according to claim 9 -- claims 1-7 -- a lens is made to hold to two or more lens maintenance fixtures given in either, respectively, the aforementioned suspension section of each lens maintenance fixture is hung and hung to a conveyance fixture, and the art of the lens characterized by immersing the aforementioned lens into processing liquid is offered

[0032] According to the art of this lens, by preparing the lens maintenance fixture corresponding to the path of a lens, or the thickness of a lens, enable mixed loading of the lens of varieties in one conveyance fixture, and it can consider as the art of the lens which was suitable at many forms and the small lot production.

[0033]

[Embodiments of the Invention] Hereafter, although the gestalt of operation of the art of the lens maintenance fixture of this invention, a conveyance fixture, and a lens is explained, this invention is not limited to the gestalt of the following operations.

[0034] Drawing 1 is the perspective diagram showing the state where the plurality of the 1st operation gestalt of the lens maintenance fixture of this invention was hung and hung in 1 operation gestalt of a conveyance fixture. Drawing 2 is front view of the lens maintenance fixture simple substance of the 1st operation gestalt which contains a cross section in part. Drawing 3 is a perspective diagram which has arranged the 2nd arm and the 3rd arm of a lens maintenance fixture simple substance of the 1st operation gestalt to the front.

[0035] As shown in drawing 1, the lens maintenance fixture 1 and the conveyance fixture 10 of this invention are made into the lens attaching part 2 of a simple substance which separates every one lens receptacle of the conventional lens maintenance fixture, and holds a lens, also use the conveyance fixture 10 as another object, and have structure which formed the suspension section 3 hung and hung to the conveyance fixture 10 in the lens attaching part 2 upper part.

[0036] As for the lens maintenance fixture 1, the whole consists of stainless steels. As shown in drawing 2, it has the hook 30 of the shape of a hook as the suspension section 3 supporting the lens maintenance fixture 1 whole which hangs on the conveyance fixture 10 and is hung. It is a little thick and the hook 30 is broad so that it may not shake, when it hangs on the conveyance fixture 10, and the inside is formed so that it may be fitted in and stabilized in cross-section abbreviation rectangle-like the upper surface and left and right laterals of the crevice for hooks which are not shown in drawing 1 of the bar 16 of the conveyance fixture 10.

[0037] It branched horizontally to the soffit of a hook 30, and has combined with the 1st arm 21 on the left-hand side of drawing 2, and the 2nd arm 22 on the right-hand side of drawing 2 at it. One 1st arm 21 is a wire-like, and is turned up by the acute angle through the coil spring 212 as an energization means in the horizontal shell lower part from the 1st horizontal level 211 prolonged mostly horizontally. The 1st ramp 213 which is turned up and inclines toward the drawing 2 right-hand side slanting lower part is bent a little inside from the perpendicular direction in the drawing 2 right-hand side upper part position of Lens L, and turns into the 1st vertical section 214 which inclines toward left-hand side a little, and is prolonged from the perpendicular direction, and the nose of cam is located near the central-site side of Lens L. The 1st attaching part 41 which contacts the right lateral of Lens L at the inside side of the point of the 1st vertical section 214 is attached in one.

[0038] The almost horizontal rectangle board 221 with which the 2nd arm 22 of another side is thick is formed in hook 30 soffit at a hook 30 and one, and further, the band-like board 222 turns a field to a lens side, and is joined to the edge of the rectangle board 221 in the perpendicular direction. The band-like board 222 is symmetrically bent by the rectangle board 221 and the acute angle with the 1st ramp 213 in rectangle board 221 lower part in a left-hand side slanting lower part, and the 2nd ramp 223 which inclines toward the drawing 2 left-hand side slanting lower part is formed. These 1st arm 21 and 2nd arm 22 are mostly bent by the coplanar. The 2nd ramp 223 intersects the 1st ramp 213 of the 1st arm 21 by the coplanar mostly, is bent [in the drawing 2 left-hand side upper part position of Lens L] a little from the perpendicular direction inside, and is the 2nd vertical section 224 which inclines toward right-hand side a little, and is prolonged from the perpendicular direction. As shown in drawing 2 and drawing 3, in the upper part of the 2nd vertical section 224, the

band-like board 222 was carried out in the perpendicular direction 2 ****s focusing on the crosswise simultaneously, and has branched as the 3rd arm 23. The 2nd vertical section 224 of the 2nd arm 22 is bent toward Lens L side under the drawing 2 left-hand side slant of Lens L, and turns into the 3rd ramp 225, and the 2nd attaching part 42 which contacts the lens L side at the inside at the nose of cam of the 3rd ramp 225 is attached in one. Eccentricity of the 2nd attaching part 42 nose of cam is carried out from the vertical line VL passing through the center of a lens, and it contacts the lower part side of the left-hand side lens L a little.

[0039] The 2nd arm 22 and the 3rd branched arm 23 are prolonged in the 2nd vertical section 224 upper part of the 2nd arm 22 almost in parallel with the 2nd vertical section 224 of the 2nd arm 22, and the nose of cam is arranged in the position which reaches near the central left-hand side side of Lens L. The 3rd attaching part 43 is formed in the inside at the nose of cam of the 3rd arm 23 at one, and the nose of cam of the 3rd attaching part 43 contacts the side at the left end of lens L.

[0040] the long and slender guidance along which the 1st arm 21 passes along a crosswise center in the 2nd ramp 223 of the band-like board 222 which intersects the 1st arm 21 of the 2nd arm 22 as shown in drawing 2 and drawing 3 -- a hole 226 punctures -- having -- guidance -- the hole 226 lets the 1st ramp 213 of the 1st arm 21 pass

[0041] The 1st attaching part 41 at the nose of cam of the 1st arm 21 is energized so that it may go to a lens L center side by the energization force of a coil spring 212. therefore, as shown in drawing 2, Lens L is the 2nd attaching part 42 about the downward side, and receives the left-hand side side by the 3rd attaching part 43, respectively -- having -- right-hand side -- the 1st attaching part 41 at the nose of cam of the 1st arm presses the upper part side a little, and it is held by the three point suspension of these 1st attaching part 41, the 2nd attaching part 42, and the 3rd attaching part 43

[0042] An example of an attaching part is shown in drawing 6. When the side of Lens L is thick, as shown in drawing 6 (a), Lens L is pinched by three attaching parts by using the tabular attaching part 401 in which the nose of cam sharpened needlelike, and pressing the sharp nose of cam on the side of Lens L. The lens maintenance fixture 1 shown in drawing 3 is equipped with the tabular attaching part 401 holding the lens L which is thick in this way. When the thickness of the side of Lens L is thin, as shown in drawing 6 (b), the M type-like tabular attaching part 402 is used for a nose of cam. When V rabbit-ear 402a at the nose of cam of the M type-like tabular attaching part 402 contacts the edges on both sides of the side of Lens L, as it dents and 402a sandwiches the side of Lens L, it is pinched by three attaching parts. The lens maintenance fixture 1 shown in drawing 1 and drawing 2 is equipped with such an attaching part 402.

[0043] The nose of cam of depression 402a of the tabular attaching part 402 shown in drawing 6 (b) is formed in edge-like 402b, and lessens area in contact with the lens L side as much as possible. The liquid membrane of the hard-coat liquid formed in the about 402 tabular attaching part lens L front face could draw near to the tabular attaching part 402 by this, and the thickness of the hard-coat film near [where the tabular attaching part 402 contacted] the lens L front face has prevented the bird clapper thinly.

[0044] since the 1st arm 21 is turned up by the acute angle through a coil spring 212, and the lens maintenance fixture 1 shown in drawing 2 and drawing 3 can take the long stroke from the supporting point of a coil spring 212 to the 1st attaching part 41 and can make [many] the amount of bending of a spring -- the 1st arm 21 -- the side of Lens L -- receiving -- alienation -- the movable range which approaches is large Therefore, it can respond to the outer diameter of the lens of the large range. For example, the outer diameter of a lens has nine kinds of 2-3mm serration in 60-80mm. Conventionally, every [this] nine kinds, although the lens maintenance fixture was required, since the movable range of the 1st arm 21 is wide, with the lens maintenance fixture 1 of this operation form, the range of 60-80mm can be covered with two kinds of lens maintenance fixtures 1. Consequently, two kinds of the tabular attaching parts 401 and 402 corresponding to the thickness of the lens shown in drawing 6 (a) and (b) are added, and all the present lenses can be mostly covered with four kinds of lens maintenance fixtures 1.

[0045] It is not necessary to prepare the lens maintenance fixture 1 of varieties, an

installation cost is reduced by this, and management also becomes simple by it. And the work classified for every path of a lens becomes simple, and productivity improves. Since possibility that a pair article can also be processed together with one conveyance fixture is high, the complicatedness of pairing also decreases.

[0046] moreover, the 1st ramp 213 of the 1st arm 21 -- guidance of the 2nd arm 22 -- the 2nd ramp 223 of the 2nd arm 22 is intersected through a hole 226 thereby -- the lens L side of the 1st arm 21 -- receiving -- alienation -- the movement which approaches -- guidance of the 2nd arm 22 -- it is restricted by the hole 226, a bird clapper is secured almost identically to the virtual flat surface in which the 2nd arm 22 bends and the movement on the flat surface of the 1st arm 21 is formed, and torsion arises mutually For this reason, the side of Lens L can be certainly pinched by the 1st attaching part 41 and the 2nd attaching part 42.

[0047] Moreover, the 2nd attaching part 42 supporting the lower part of Lens L is in the position which carried out eccentricity from the vertical line VL passing through a lens L center, and shifted to the left about about 10mm, when the part which is in contact with the side of a lens hangs the lens maintenance fixture 1 by the hook 30 to the conveyance fixture 10, as shown in drawing 2.

[0048] In case Lens L will be pulled up after flooding with hard-coat liquid if the contact position to the side of the lens L of the 2nd attaching part 42 is on the vertical line VL passing through a lens L center, hard-coat liquid can draw near to the 2nd attaching part 42 from a lens L front face, and it is admitted experientially that a tree-like stripe occurs.

[0049] In the lens maintenance fixture 1 of this operation form, since the contact position of the 2nd attaching part 42 is carrying out eccentricity from on the vertical line VL passing through a lens center, generating of the stripe of the shape of such a tree can be suppressed.

[0050] Moreover, in the lens maintenance fixture 1 of this operation form, as shown in drawing 3, the 2nd arm 22 of the perpendicular direction is divided perpendicularly, and the 3rd arm 23 branches, is prepared, and arranges in parallel the 2nd arm 22 and the 3rd arm 23 in the thickness direction of Lens L. Consequently, it has structure without what mediates between the 2nd arm 22 and the lens L side in addition to 2nd attaching part 42. It has similarly structure without what touches the lens L side in addition to 1st attaching part 41 and 3rd attaching part 43, respectively about the 1st arm 21 and the 3rd arm 23. Therefore, in case it is immersed and a lens is pulled up in hard-coat liquid, the film of hard-coat liquid is formed between the lens L side, and these 1st arm 21, the 2nd arm 22 and the 3rd arm 23. If the film of hard-coat liquid is formed, although the drop which burst when a film burst will adhere to a lens and will become a poor cause of generating, in the lens maintenance fixture 1 of this operation form, it has structure which such a defect cannot produce easily.

[0051] The work which makes Lens L hold to the lens maintenance fixture 1 For example, draw near to the rectangle board 221 side of the 2nd arm 22 with a finger the 1st ramp 213 which has become the 2nd arm 22 of the 1st arm 21, and aslant after intersection, and the 1st arm 21 is opened greatly. What is necessary is making it just make the 1st attaching part 41 at the nose of cam of the 1st arm 21 contact the lens L side according to the energization force of a coil spring 212, after making the side of Lens L contact the 2nd attaching part 42 and the 3rd attaching part 43.

[0052] Since Lens L can be made to hold to the lens maintenance fixture 1 by such work, unlike the work which equips the slit of the lens receptacle 610 of the conventional lens maintenance fixture 600 with Lens L, a possibility of attaching a blemish to Lens L can be small, and can raise the yield.

[0053] Moreover, since it is breakage of the lens maintenance fixture 1 for one lens when the lens maintenance fixture 1 is damaged, unlike the lens maintenance fixture 500 equipped with 30 conventional lenses, there is an advantage with which there is little loss and it can be managed.

[0054] Next, the 2nd operation form of the lens maintenance fixture of this invention is explained, referring to drawing 4 · drawing 6. The perspective diagram which looked at drawing 4 from the transverse-plane side of a lens maintenance fixture, and drawing 5 are the perspective diagrams seen from front slant.

[0055] To the lens maintenance fixture 1 of the 1st operation form, lens maintenance fixture

1b of the 2nd operation form enables uniform adhesion of hard-coat liquid to the lens side by improvement of an attaching part, and improves washing nature further.

[0056] The whole consists of stainless steels and this lens maintenance fixture 1b has hook 30b as suspension section 3b supporting the whole lens maintenance fixture 1b, and lens attaching part 2b combined with this hook 30b by hanging and hanging at the topmost part at the bar 16 of the conveyance fixture 10. Hook 30b has supporter 31b and this which have the configuration of a reverse concave which bent the thick rectangle board a little, was formed, and was formed so that it might be fitted in and stabilized in cross-section abbreviation rectangle-like the upper surface and left and right laterals of the crevice for hooks which are not shown in drawing 1 of the bar 16 of the conveyance fixture 10, and horizontal plate 32b currently formed in one.

[0057] The end face section is combined with horizontal plate 32 of hook 30b b, respectively, and lens attaching part 2b has 1st arm 21b from which the point is the free end, 2nd arm 22b, and 3rd arm 23b. These 1st arm 21b, 2nd arm 22b, and 3rd arm 23b consist of wires with an almost circular cross section fundamentally.

[0058] The end face section of 1st arm 21b is joined to the upper surface of horizontal plate 32b of hook 30b by this and parallel. From 1st horizontal-level 211b horizontally extended from the end face section, it is turned up by the acute angle through coil-spring 212b as an energization means in the horizontal shell slanting lower part. It is set to 1st vertical section 214b which 1st ramp 213b which is turned up and inclines toward the drawing 4 diagonal right side is bent a little inside a little than the perpendicular direction on the right-hand side from the right-hand side edge of Lens L, inclines toward left-hand side a little from the perpendicular direction, and is extended, and the nose of cam is located near the central right lateral of Lens L. The point of 1st arm 21b is flatly formed with a press etc., attachment section 215b is formed, and the end face section of 1st attaching part 41b which bent the narrow wire and was formed is joined to attachment section 215b. The portion which starts from the end face section of 1st attaching part 41b is mostly located in the nose-of-cam edge of 1st arm 21b.

[0059] The end face section is joined to the horizontal plate 32b undersurface of hook 30b through the guide plate 24 with which the cross section was formed in omega type, respectively, and, as for 2nd arm 22b and 3rd arm 23b, 1st arm 21b has the 1st horizontal level 221b and 231b currently extended to the reverse drawing right horizontal direction from the end face section. It is sharply bent toward a left-hand side slanting lower part from these 1st horizontal level 221b and 231b, and the 2nd ramp 222b and 232b currently extended to the method of this diagonal below intersects 1st arm 21b so that 1st ramp 213 of 1st arm 21b b may be inserted from both sides. It is bent a little rightward a little than the perpendicular direction on the left-hand side from the left end of the 2nd ramp 222b and 232b to the lens L, and has become the 2nd vertical sections 223b and 233b which incline toward right-hand side a little from the perpendicular direction. 2nd arm 22b is further bent toward a right-hand side lower part by the lens L diagonal below side, and turns into 3rd ramp 224b, further, it is bent so that it may go to a lens L center side, and attachment section 225b is formed. attachment section 225b at the nose of cam of 2nd arm 22b -- the side of a lens L lower part -- it is located a little near the left-hand side 2nd attaching part 42b is joined to attachment section 225 of 2nd arm 22b b. The nose of cam which showed 2nd attaching part 42b to drawing 6 (b) is the M type-like tabular attaching part 402. The nose of cam of 2nd vertical section 232b of 3rd arm 23b is extended so that it may be located near the lens L central left lateral. The point of 2nd vertical section 233b of 3rd arm 23b is flatly formed with a press etc., attachment section 235b is formed, and the end face section of 3rd attaching part 43b which bent the wire and was formed is joined to attachment section 235b. The portion which starts from the end face section of 3rd attaching part 43b is mostly located in the nose-of-cam edge of 3rd arm 23b. The upper part of each 2nd vertical section 223b and 233b of 2nd arm 22b and 3rd arm 23b is being mutually fixed by the connecting plate 25 so that each 2nd vertical section 223b and 233b of 2nd arm 22b and 3rd arm 23b may be parallel mostly with the side of Lens L. it is shown in drawing 5 -- as -- the [1st arm 21b, 2nd arm 22b, and] -- 3 arm 23b is bent so that it may be parallel mostly with the side of Lens L

[0060] 1st attaching part 41b and 3rd attaching part 43b which are attached in lens maintenance fixture 1b of the 2nd operation gestalt are the wire-like attaching part 404 which bent the narrow wire and was formed, as shown in drawing 6 (d). The wire-like attaching part 404 has ***** 404a that a wire should bend in the shape of ***** so that the side contacts each ends edge of the both-sides side of right and left of thin lens L. Connection 404b which connects this ***** 404a to the end face section joined to each attachment section 215b and 235b of 1st arm 21b and 3rd arm 23b starts from the nose-of-cam edge of each attachment section 215b and 235b, and is extended in the side of Lens L, and the direction from which it separated. In lens maintenance fixture 1b shown in drawing 4 and drawing 5, 1st attaching part 41b and 3rd attaching part 43b are the wire-like attaching parts 404 shown in this drawing 6 (d), and although 2nd attaching part 42b was the tabular attaching part 402 shown in drawing 6 (b), 2nd attaching part 42b is also good also as a wire-like attaching part 404. When the side is a thick lens, as shown in drawing 6 (c), the needlelike wire-like attaching part 403 in which the nose of cam of a wire sharpened, respectively is used for 1st attaching part 41b, 2nd attaching part 42b, and 3rd attaching part 43b.

[0061] Lens maintenance fixture 1b of the 2nd operation gestalt is 1st attaching part 41b and 3rd attaching part 43b about the right-and-left both-sides side of Lens L, and holds the side of the lower part of Lens L by 2nd attaching part 42b. Since fundamental composition is almost the same as the lens maintenance fixture 1 of the 1st operation gestalt, lens maintenance fixture 1b of the 2nd operation gestalt has the same effect as the lens maintenance fixture 1 of the 1st operation gestalt.

[0062] That is, 1st arm 21b was sharply bent through coil-spring 212b, and since the movable range is wide, while it is long, and the stroke of 1st attaching part 41b can respond to the outer diameter of the lens L of the large range, a possibility of attaching a blemish during the work equipped with Lens L at a lens has decreased. Moreover, since the part which is in contact with the side of the lens L of 2nd attaching part 42b is located in the position which carried out eccentricity from the vertical line VL passing through the center of Lens L when it hangs lens maintenance fixture 1b to the conveyance fixture 10, there is no possibility of processing liquid being able to draw near to 2nd attaching part 42b, and making the thickness of the liquid membrane of the processing liquid of a lens L front face producing an ununiformity.

[0063] Moreover, 1st ramp 213of 1st arm 21b b is inserted with 2nd ramp 222of 2nd arm 22b b, and 2nd ramp 232of 3rd arm 23b b, and crosses. thereby -- the lens L side of 1st arm 21b -- receiving -- alienation -- so to speak, 2nd ramp 232of 2nd ramp 222of 2nd arm 22b b and 3rd arm 23b b regulates the movement which approaches as guidance, and the bird clapper is mostly secured to parallel for the movement on the flat surface of 1st arm 21b with the side of Lens L

[0064] lens maintenance fixture 1b of the 2nd operation form -- these effects -- in addition, 1st arm 21b, 2nd arm 22b, and 3rd arm 23b -- a cross section -- it consists of circular wires and a surface area becomes the minimum Therefore, there is little coating weight of hard-coat liquid, and since an affix moreover ****s simply by washing, the effect that it can wash easily is added. Moreover, since 1st attaching part 41b and 3rd attaching part 43b are the wire-like attaching parts 404 which bend a narrow wire and are formed, There is less coating weight of processing liquid than the tabular attaching part 402 shown in drawing 6 (b). Therefore, a possibility of hard-coat liquid being able to draw near to 1st attaching part 41b and 3rd attaching part 43b, and making the thickness of the liquid membrane of the processing liquid of a lens L front face producing an ununiformity decreases, and it is admitted that the yield in hard-coat processing improves notably. Moreover, the coating weight of hard-coat liquid decreases by having changed the tabular attaching part 401 shown in drawing 6 (a) into the wire-like attaching part 403 drawing 6 (c) Shown.

[0065] Furthermore, lens maintenance fixture 1b of the 2nd operation form has structure which cannot do the film of hard-coat liquid further easily from the lens maintenance fixture 1 of the 1st operation form. That is, the film of hard-coat liquid might arise between the tabular attaching part 402 which consists of metal plates with which the 1st attaching part 41

and the 3rd attaching part 43 of the lens maintenance fixture 1 of the 1st operation form have started from the position which kept its distance a little on slant, and are bent from the nose-of-cam edge of the 1st arm 21 and the 3rd arm 23, respectively, this, and the side of the lens L which has countered. on the other hand, in lens maintenance fixture 1b of the 2nd operation form 1st attaching part 41b The thing of 1st arm 21b for which 3rd attaching part 43b has mostly the structure of 3rd arm 23b of starting from a nose-of-cam edge mostly from the nose-of-cam edge, Wire-like attaching part 404 by having turned to the direction where connection 403b connected with ***** 404a which goes away tends toward the side of Lens L, and a different direction It is hard to produce the film of hard-coat liquid with high viscosity between the lens L side and attaching parts 41b and 43b, and poor generating by membranous burst has stopped being able to happen easily.

[0066] These 1st operation forms reach lens maintenance fixture 1, and, as for lens maintenance fixture 1b of the 2nd operation form, the 1st arm 21 and 21b energizes the 1st attaching part 41 and 41b at a nose of cam to Lens L side by the energization force of coil-spring 212,212b, respectively. Therefore, it is possible to change the spring pressure of coil-spring 212,212b by making thick the wire size of the 1st arm 21 and 21b which constitutes coil-spring 212,212b, for example, or making it thin. For example, by making thin the wire size of the 1st arm 21 and 21b, spring pressure is decreased and it becomes possible to hold without also making the un-circular lens with which the periphery edge became thin transform. That is, this un-circular lens is a thin shape lens which deleted the whole thickness equally, when there is hope of the customer who wants to make thickness (inside web thickness) of a lens thin. With a convex lens (lens of + range), the periphery section especially becomes thin, and the periphery section is deleted and it may become an ellipse form and a non-round shape. The periphery edge of the un-circular lens with which the periphery section was deleted is sharp like [it is thin and] the edge of a blade, and when heat is applied in the state where it inserted from both sides by the strong force, there is a possibility of producing deformation. In the lens maintenance fixtures 1 and 1b of this invention, such an un-circular lens can also be held by changing the spring pressure of coil-spring 212,212b.

[0067] Next, the conveyance fixture of this invention which conveys the lens maintenance fixtures 1 and 1b of this invention is explained. As shown in drawing 1, the conveyance fixture 10 is the direction where shaft orientations and the alignment boards 12 and 13 of a rectangle tabular cross at right angles on the ends edge of the main shaft rod 11, and is horizontally formed in one, and it is formed in one so that the cross-section [of V characters]-like delivery board 14 may insert the main shaft rod 11 from the bottom inside both sides from the alignment boards 12 and 13 of the main shaft rod 11. Furthermore, the fishing rod 15 of the perpendicular direction is formed in one on the inner direction undersurface of the both sides of the delivery board 14 of the main shaft rod 11, and the bar 16 is mostly formed in parallel with the main shaft rod 11 at this fishing rod 15 and one. Two or more lens maintenance fixtures 1 and 1b can be collectively conveyed by hanging and hanging the hooks 30 and 30b of the lens maintenance fixtures 1 and 1b to this bar 16.

[0068] The side elevation of 1 operation form of the conveyance fixture 10 is shown in drawing 7. Drawing 7 shows the array of the crevice 17 for hooks established in the bar 16. The inside of the hooks 30 and 30b of the lens attaching part 1 is inserted in, this crevice 17 for hooks is fixed, and 20 crevices 17 for hooks are formed with this conveyance fixture 10 from the crevice 17-1 for the 1st hook of the leftmost of drawing 7 to the rightmost crevice 17-20 for the 20th hook. A little broad heights are prepared between the crevice 17-1 for the 1st hook, and the next crevice 17-2 for the 2nd hook. The crevice 17-2 for the 2nd hook, the next crevice 17-3 for the 3rd hook and the crevice 17-3 for the 3rd hook, and the crevice 17-4 for the 4th hook are separated by the narrow heights which divide the crevice for hooks mutually. Furthermore, it is separated by comparatively broad heights by the crevice 17-4 for the 4th hook, and the next crevice 17-5 for the 5th hook like the interval of the crevice 17-1 for the 1st hook, and the crevice 17-2 for the 2nd hook. They are 3 cannons equipped at a battery from the crevice 17-6 for the 6th hook up to the crevice 17-8 for the 8th hook like the crevice 17-2 for the 2nd hook to the crevice 17-4 for the 4th hook. The same array as the crevice 17-1 for the 1st hook to the 17

to concave 4 section for the 4th hook is henceforth repeated from the crevice 17-5 for the 5th hook.

[0069] The crevice 17-2 for the 2nd hook of 3 cannons equipped at a battery - the crevice 17-4 for the 4th hook are formed at intervals of Pitch a, respectively. The pitch between the crevice 17-1 for the 1st hook and the crevice 17-2 for the 2nd hook is the pitch b of the pitch of the double precision of Pitch a, and between the crevice 17-4 for the 4th hook and the crevices 17-5 for the 5th hook is the interval of Pitch b between the crevice 17-2 for the 2nd hook, and the crevice 17-4 for the 4th hook. On the other hand, since the pitch between the crevice 17-1 for the 1st hook and the crevice 17-3 for the 3rd hook is the pitch $b + \text{pitch } a$, it is the pitch c of a 3 times as many pitch as Pitch a, and the pitch between the crevice 17-3 for the 3rd hook and the crevice 17-5 for the 5th hook is also Pitch c. For example, Pitch a is [20mm and Pitch c of 10mm and Pitch b] 30mm.

[0070] Namely, the conveyance fixture 10 of this operation gestalt can choose now Pitch b or Pitch c with the thickness of a lens. For example, when hanging the lens maintenance fixtures 1 and 1b holding the thin lens of the thickness of a lens on the conveyance fixture 10 When hanging in Pitch b and hanging the lens maintenance fixtures 1 and 1b with the thick thickness of a lens which carried out lens maintenance, the maximum lens number of sheets according to the thickness of a lens can be easily set to the conveyance fixture 10 by choosing and hanging Pitch c, without contacting both lenses. Moreover, it is also possible while choosing and hanging Pitch b to load together the lens of the thickness of a different lens and to set to the conveyance fixture 10 by choosing Pitch c and hanging a lens with the thick thickness of a lens.

[0071] The conveyance fixture 10 of this operation gestalt did not put the crevice 17 for hooks in order at equal intervals, but it arranges the crevice 17 for hooks at intervals of an inequality so that a pitch can be chosen easily.

[0072] Next, operation is explained although the lens maintenance fixtures 1 and 1b and the conveyance fixture 10 were combined. As shown in drawing 1, the lens maintenance fixtures 1 and 1b which were made to hold Lens L to the lens maintenance fixtures 1 and 1b of this invention, and held Lens L can be hung on the bar 16 of the conveyance fixture 10 of this invention, and various processings can be performed to the hung lens L.

[0073] For example, before hard-coat processing, it conveys to pretreatment tubs, such as an alkali treatment, acid treatment, and a pure water washing tub, Lens L is immersed in these pretreatment tubs one by one, and a lens side is washed.

[0074] Next, the conveyance fixture 10 is conveyed to a hard-coat processing tub, the alignment boards 12 and 13 of the conveyance fixture 10 are inserted in a position arrangement crevice, and it carries out being predetermined-time immersed of the lens L which the conveyance fixture 10 is dropped and is held with the lens maintenance fixtures 1 and 1b into hard-coat liquid. Then, a conveyance fixture is pulled up at a predetermined raising speed, and the liquid piece of the hard-coat liquid adhering to Lens L is carried out. Then, the conveyance fixture 10 is conveyed to a drying furnace, and the hard-coat liquid adhering to Lens L and the lens maintenance fixtures 1 and 1b is dried.

[0075] Next, the lens L to which the hard-coat film dried, for example has adhered can be removed from the lens maintenance fixtures 1 and 1b, Lens L can be calcinated by the firing furnace, a hard-coat film can be stiffened, and the hard-coat film which gives abrasion-proof nature can be formed in a lens front face.

[0076] Thus, since the lens L of varieties can be loaded together and processed to the conveyance fixture 10 by combining the lens maintenance fixtures 1 and 1b and the conveyance fixture 10 of this invention, corresponding to many forms and a small lot, a lens can be processed efficiently.

[0077] Moreover, Lens L is made to hold with the lens maintenance fixtures 1 and 1b of this invention, the lens maintenance fixtures 1 and 1b are hung on the conveyance fixture 10, and it floods with hard-coat liquid below a connecting plate 25 by lens maintenance fixture 1b of the 2nd operation form below the branch point of the 2nd arm 21 and the 3rd arm 23 with the lens maintenance fixture 1 of the 1st operation form by the method of flooding Lens L with hard-coat liquid. That hard-coat liquid adheres in addition to Lens L The nose of cam of the

1st - the 3rd arm 21, 21b, 22, 22b, 23, and 23b, and the 1st - the 3rd attaching part 41 and 41b, Since hard-coat liquid does not adhere to the skeleton which are 42, 42b, 43, and 43b, and supports these arms 21, 21b, 22, 22b, 23, and 23b the amount in which hard-coat liquid adheres to the lens maintenance fixtures 1 and 1b is markedly boiled as compared with the conventional lens maintenance fixture 600, there are and they end [few] Consequently, while the use efficiency of hard-coat liquid improves, the amount of the detergent used which washes a lens maintenance fixture can also decrease, and a production cost can be reduced.

[0078] In the above-mentioned explanation, although the suspension section is explained as a hook-like hook, it may be a configuration like the shape of the shape of a ring imposed, for example on a lobe, and T character which is imposed on two or more bars. Moreover, the structure which prepared the hook-like lobe is sufficient also as a conveyance fixture, and you may be the structure which arranged the bar in parallel.

[0079]

[Effect of the Invention] Since the lens maintenance fixture of this invention held a lens for every sheet and it was made to hang it to a conveyance fixture separately, it became possible [loading together the lens of varieties to one conveyance fixture efficiently corresponding to many forms and a small lot].

[0080] The conveyance fixture of this invention can set a lens maintenance fixture easily corresponding to the thickness of a lens.

[0081] According to the art of the lens of this invention, since the lens of varieties can be processed collectively, corresponding to many forms and a small lot, a lens can be processed efficiently.

[Translation done.]

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